"A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom-vilom Pranayama on prevention of postoperative pulmonary complication among patients undergoing cardiac surgery at AIIMS Bhopal."

Dissertation

Submitted to the Faculty of Nursing

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

In partial fulfillment of requirement for the degree of

M.Sc. Nursing in Medical Surgical Nursing

(Cardiological / Cardiothoracic Vascular Nursing)

By

Ms. Mamta Ratawa

(Enrollment no-2200052N07P75012)

Under the guidance of

Dr. Anurag Bhai Patidar
Associate professor
Nursing college, AIIMS, Bhopal

August 2024

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

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GUIDE:

Dr. Anurag Bhai Patidar

Associate Professor

Nursing College, AIIMS Bhopal

CO-GUIDE:

Mrs. Ranjana Verma Ranjana

Assistant Professor

Nursing College, AIIMS Bhopal

Dr. Yogesh Niwariya

Additional Professor

CTVS Department, AIIMS Bhopal

Date: 13.02.2024

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

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14/02/2024.

Dr. Mamta Verma

Principal (I/C)

Nursing College

AIIMS, Bhopal

ALL INDIA INSTITUTE OF MEDICAL SCIENCES, BHOPAL

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Ms. Mamta Ratawa

GUIDE:

Dr. Anurag Bhai Patidar Anurag

Associate Professor

Nursing College, AIIMS Bhopal

CO-GUIDE:

Mrs. Ranjana Verma Ranjana

Assistant Professor

Nursing College, AIIMS Bhopal

Dr. Yogesh Niwariya

Additional Professor

CTVS Department, AIIMS Bhopal

Place: Bhopal

Date: 13.02.2024

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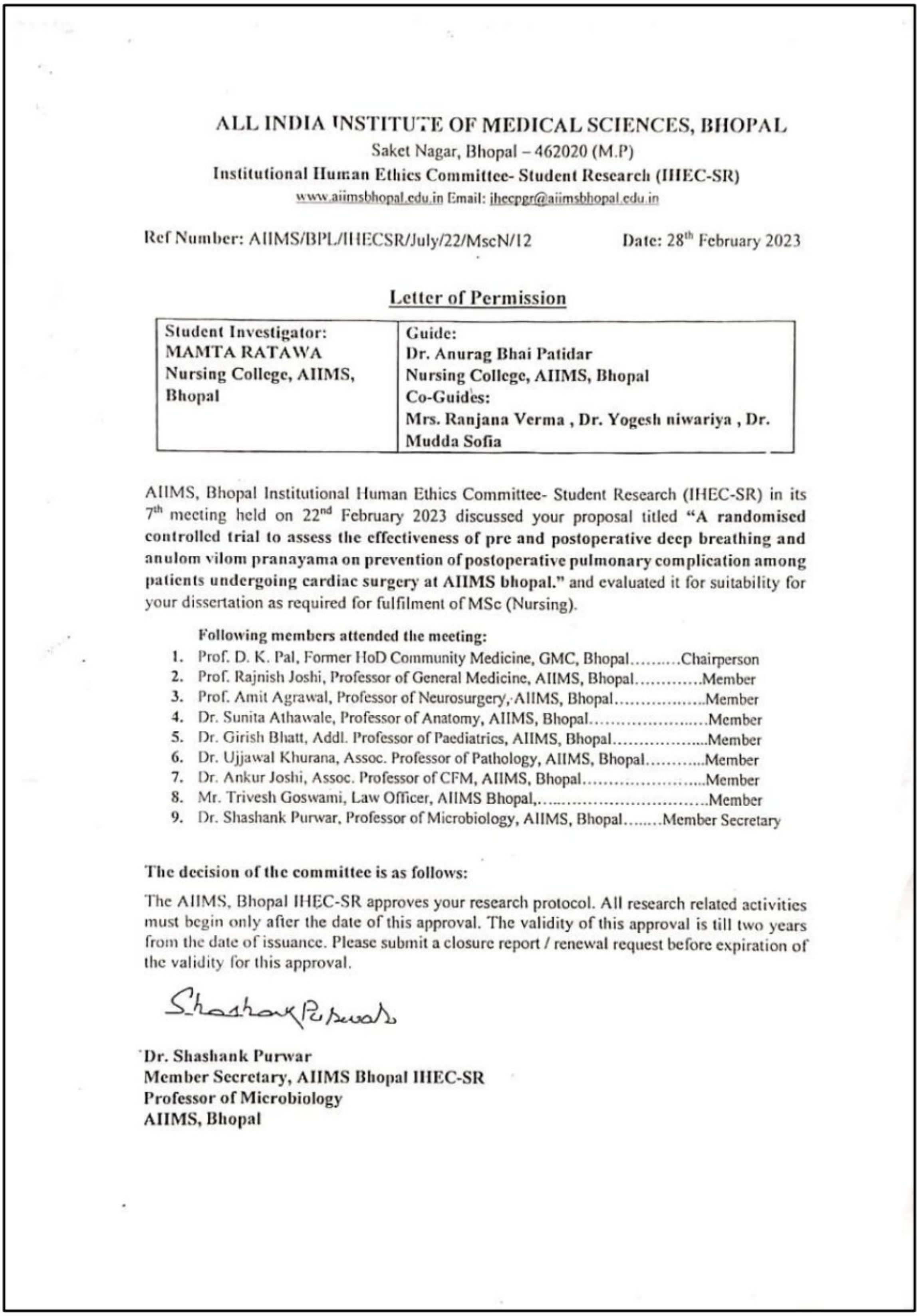

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Student Investigator: **MAMTA RATAWA** **Nursing College, AIIMS, Bhopal**	**Guide:** **Dr. Anurag Bhai Patidar** **Nursing College, AIIMS, Bhopal** **Co-Guides:** **Mrs. Ranjana Verma , Dr. Yogesh niwariya , Dr. Mudda Sofia**

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1. Prof. D. K. Pal, Former HoD Community Medicine, GMC, Bhopal..........Chairperson
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3. Prof. Amit Agrawal, Professor of Neurosurgery, AIIMS, Bhopal..................Member
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Dr. Shashank Purwar
Member Secretary, AIIMS Bhopal IHEC-SR
Professor of Microbiology
AIIMS, Bhopal

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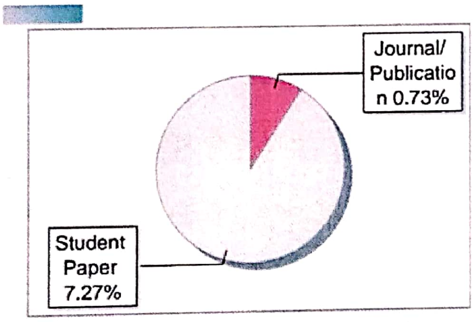

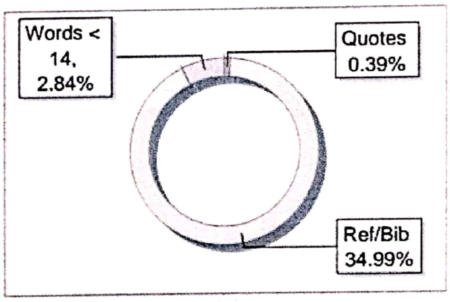

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"Strive to find things to be thankful for, and just look for the good in who you are."

-Bethany Hamilton

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Ms. Mamta ratawa

ABSTRACT

Introduction:

The most frequent occurrences that arise after cardiac, thoracic, and abdominal procedures are postoperative pulmonary complications (PPCs), which account for 30–60% of CABG surgeries. Postoperative pulmonary complications (PPCs) significantly contribute to morbidity and mortality among patients undergoing cardiac surgery. This study aims to investigate the effectiveness of two respiratory interventions, deep breathing exercises and Anulom Vilom Pranayama, in reducing the incidence of PPCs in this patient population.

Methodology:

A randomized controlled trial was conducted among patients scheduled for cardiac surgery. Participants were recruited conveniently and were randomly assigned by the SNOSE method to the experimental and control groups. The experimental group performed deep breathing, and Anulom Vilom Pranayama and a control group received standard postoperative care. The interventions were initiated preoperatively for 5 days and in the postoperative period for 3 days, that is, from the 2nd to the 4th postoperative day. The interventions were provided twice a day. Primary outcomes included the incidence of PPCs, such as atelectasis, pulmonary oedema, pleural effusion, and pneumonia, assessed through clinical examination and chest radiography. The secondary outcomes included the length of the ICU stay in the postoperative period.

Results:

The Chi square test indicates a statistically significant reduction in the incidence of PPCs in terms of atelectasis among participants in the experimental group compared to the control group, with a p value of 0.008 (< 0.05). Moreover, the interventions demonstrated a positive impact on the duration of the ICU stay, with a mean value of 4 days in experimental group and 5.60 days in the control group, which is found to be statistically significant with a p value of 0.0054 (< 0.05). The present study also discovered that there is no association between PPCs and selected socio-demographic variables. There is a significant association found between PPCs (pulmonary edema) and selected clinical variables (co-morbidity) in the control group p = 0.047), and there is a significant association found between pneumonia and duration of surgery (p = 0.028) in the control group. And there is a significant association found between pneumonia and length of ICU stay in both groups (p = 0.043 and 0.007)..

Conclusion:

This randomized controlled trial provides evidence supporting the beneficial effects of incorporating deep breathing and Anulom Vilom Pranayama into the pre- and post-operative care of patients undergoing cardiac surgery. These interventions not only show promise in reducing the occurrence of PPCs but also contribute to reducing ICU length of stay. Further research with a larger sample size and longer follow-up periods is warranted to validate these findings and establish the long-term benefits of these respiratory interventions in the cardiac surgery population.

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ABBREVIATIONS

Abbreviations	**Full Form**
CABG	Coronary artery bypass grafting
CAD	Coronary artery disease
ASD	Atrial septal defect
VSD	ventricular septal defect
AIIMS	All India Institute of Medical Sciences
CVI	Content validity index
IHEC –SR	Institutional ethic committee – student research
M.Sc.	Master of Science
PPC	Post-operative pulmonary complication
WHO	World health organization
SD	Standard deviation

LIST OF SYMBOLS

S.NO	SYMBOLS	EXPANSION
1.	%	Percentage
2.	>	More than
3.	<	Less than
4.	≥	Equal to or more than
5.	H0	Null Hypotheses
6.	H1	Research Hypotheses
7.	P	Level of significance
8.	D	Precision
9.	&	And
10.	=	Equal to

CHAPTER I

INTRODUCTION

CHAPTER I

INTRODUCTION

Background of the study

Cardiovascular disease is a leading cause of mortality worldwide. An estimated 17.9 million people died from CVDs in 2019, representing 32% of all global deaths. Of these deaths, 85% were due to heart attack. [1] Globally it's estimated that 1 in 13 people are living with a heart or circulatory disease. Each year around 60 million people across the world develop a heart or circulatory disease that's almost the same as the entire population of the UK. [2]Heart and circulatory diseases cause around 1 in 3 deaths globally; an estimated 20.5 million deaths in 2021 - an average of 56,000 people each day or one death every 1.5 seconds.[3]Heart and circulatory diseases are the world's biggest killers in 2019 coronary heart disease was the single biggest killer globally Around 20.5 million deaths due to heart disease globally , 12 million deaths due to heart diseases in Asia and Australia region.[3]

Before the corona virus pandemic, coronary heart disease had been the leading cause of death worldwide for at least 30 years.[3]

As cardiac diseases are most abundantly found in these generations, cardiac surgeries are like angioplasty, CABG, valve repair and replacement, atrial and ventricular septum closure and so on are the treatment of choice after the pharmacological management. It has been estimated that >230million major surgeries occur annually [6] Although advancement in surgical techniques and perioperative and postoperative nursing cares, cardiac surgeries are accounting for the wide range of pulmonary complications , mortality and morbidity. [4]

Postoperative pulmonary complications (PPCs) are most common incidents develop following cardiac, thoracic and abdominal surgeries that accounts for 30-60% for CABG.[5] Pulmonary complication after cardiac surgeries is a major cause of morbidity.[8]These complications include atelectasis, pneumonia, bronchitis pleural effusion, pulmonary edema and respiratory insufficiency[9]

An international multicenter prospective study was done across 43 cardiac surgery centers located in 9 countries to report the incidence of PPCs after cardiac surgeries, it revealed that 55% (373 out of 676) patients with the presence of PPC was associated with longer ICU length of stay.[7]Y Using Wang et al (2023) conducted a retrograde observational study to compare tools for postoperative pulmonary complication after cardiac surgery in which, clinically observed incidence of atelectasis shows higher that was (51.4%) than pneumonia (20.9%) and respiratory failure (6.5%). [10]Atelectasis is a most prevalent complication after CABG [11]The cause for this incidence is unclear but several factors can contribute such as, general anesthesia, excess pleural fluid, impairment in diaphragm function.[12]

Breathing exercises, Chest physiotherapy and early ambulation are time-honored element of postoperative recuperation, endeavors to forestall or diminish the occurrence of pulmonary complications following surgery.[13]

Thorén et al.19 presented the first major study showing benefits from postoperative maximal inspiration among abdominal surgery patients. Encouraging patients to engage in profound inhalation is grounded in theory, as deep breathing serves to expand collapsed alveoli, atelectasis, reinstate lung volume, and forestall the development of a restrictive postoperative breathing pattern.[14]To lower the chances of lung issues such as pneumonia, doing breathing exercises that make you take deeper breaths is really helpful, as shown in a study by Silva, Li, and Rickard[15].These exercises can be beneficial for patients after surgery who breathe quickly and hesitate to cough. Staying inactive or in bed too much can overload lungs and lead to pneumonia, but it can be avoided this by doing exercises that involve coughing and taking deep breaths. The correct technique for coughing and deep breathing encourages lung inflation/expansion, opening the airways and moving static secretions, thereby potentially reversing the effects of pulmonary fluid accumulation and avoiding stasis and infection.[16] Implication of deep breathing exercise shown to reduce the occurrence and severity of PPCs

Breathing serves as a dynamic connection linking the body and mind. [17]While breathing instinctively fulfills the body's oxygen requirements, it is also recognized that deliberately managing one's breath can serve as a method to improve both mental and physical capabilities. Pranayama, derived from the Sanskrit words "prana" (signifying breath of life or vital energy) and "ayama" (indicating expansion, regulation, or control), encompasses the yogic practice of intentional manipulation of the breath. This includes purposeful alterations in the breathing process, such as swift diaphragmatic breathing, gradual and deep breaths, alternate nostril breathing, and the retention of breath, typically performed in a seated position.[21]Engaging in pranayama has been observed to regulate the autonomic status of the heart, leading to enhanced cardiorespiratory functions.[18]Various types of breathing exercises, such as diaphragmatic breathing, alternate nostril breathing (anulom vilom), and kapalbhati, have been recognized for their utility in conditions like chronic asthma, chronic obstructive pulmonary disease (COPD), gastroesophageal reflux disease (GERD), post-operative care following head and neck surgery, cardiovascular surgery, and upper abdominal surgery.[19]In contemporary times, the significance of pranayama and various breathing exercises has increased, primarily attributed to their clear contribution to enhancing blood oxygenation and maximizing lung capacity utilization. This, in turn, aids in the prevention of numerous diseases and complication. Pranayama is considered an art that involves intentional, rhythmic, and intense techniques to purposefully move and expand the respiratory organs [20]

Need and significance of the study

In the context of cardiac surgery, investigating the impact of deep breathing and Anulom Vilom Pranayama on postoperative pulmonary complications holds significant value. Understanding and addressing the potential benefits of these breathing techniques can contribute to enhancing postoperative outcomes for patients undergoing cardiac procedures.

Deep breathing and Anulom Vilom Pranayama are known to enhance respiratory function by promoting lung expansion and improving oxygenation. Investigating their effects post-cardiac surgery is crucial for ensuring optimal respiratory well-being, which is particularly important given the vulnerability of the respiratory system during such procedures. Postoperative pulmonary complications are a common concern after cardiac surgery and can significantly impact recovery.

Exploring the potential of deep breathing and Anulom Vilom Pranayama to mitigate these complications is essential for developing strategies that may reduce the overall burden on patients and healthcare resources. Integrating complementary practices like pranayama into traditional medical care aligns with the principles of holistic nursing and healthcare Assessing the impact of these techniques on postoperative outcomes adds a dimension of holistic patient care, acknowledging the interconnectedness of physical and mental well-being. Understanding the effects of deep breathing and pranayama on postoperative recovery empowers healthcare providers to offer more patient-centered approaches to care. Incorporating practices that patients can actively participate in may enhance their sense of control over their recovery process. The study on the effect of deep breathing and Anulom Vilom Pranayama on postoperative pulmonary complications in patients undergoing cardiac surgery is vital for advancing our understanding of holistic approaches to improve patient outcomes in the challenging postoperative period. Implementing evidence-based interventions such as deep breathing techniques and pranayama in postoperative care can enhance nursing practice by providing nurses with additional tools to promote respiratory health and prevent complications. Nurses play a critical role in patient education and support, and having evidence-based strategies to share with patients can empower them to take an active role in their recovery. Also conducting a study to evaluate the effectiveness of deep breathing techniques and pranayama in preventing postoperative pulmonary complications after cardiac surgery holds significant implications for nursing practice, including improving patient outcomes, enhancing nursing practice, supporting holistic care, promoting patient-centered care, and contributing to evidence-based practice. There are few studies conducted in this area therefore, researcher planned to undertake this study.

Title of the study

A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom -vilom Pranayama on prevention of postoperative pulmonary complications among patients undergoing cardiac surgery at AIIMS Bhopal."

Research Question

1. Is deep breathing and anulom -vilom exercises are effective along with incentive spirometry to preventpulmonary complication among post- operative cardiac patients?

Objectives

1. To plan and implement Deep breathing and, anulom –vilom pranayama along with incentive spirometry intervention among cardiac patients undergoing surgery.
2. To assess the effectiveness of deep breathing, anulom –vilom pranayama along with incentive spirometry among post-operative cardiac patients in terms of post-operative pulmonary complications.
3. To find out the association between postoperative pulmonary complications with selected sociodemographic and clinical variables among post-operative cardiac patients cardiac patients

Hypothesis

H01- There will be no significant difference between experimental and control group in terms of post-operative pulmonary complication at 0.05 level of significance**.**

H02 – There is no significant association between postoperative pulmonary complication with selected sociodemographic and clinical variables.

Operational Definitions

Post-operative pulmonary complication (PPCs): In this study, post-operative pulmonary complications (PPCs) refer to pulmonary abnormalities detected by chest x-ray as evaluated by CTVS surgeon that identified as recognisable diseases such as atelectasis, pleural effusion, pulmonary oedema, and pneumonia diseases such pneumonia, atelectasis, pleural effusion, and pulmonary oedema. After cardiac surgery that adversely affect the patient’s outcome.

Anulom-vilom pranayama: in this study**,** anulom vilom pranayama refers to a specific form of controlled breathing originating from traditional yoga practices, involving alternating nostril breathing. It typically consists of inhaling through one nostril while blocking the other, followed by exhaling through the alternate nostril and repeating the same till 10 rounds.

Delimitation

The study was delimited to:

- The study was limited to cardiac patient who were scheduled for surgery at CTVS ward.
- Patients admitted in CTVS ward and CTVS ICU at AIIMS Bhopal.

Conceptual framework

Conceptual framework presents logically constructed concepts to provide explanation of relationship between variable under research. Conceptual framework usually constructed based on researcher's own experiences, previous study findings or concepts used in various theories and studies.

The present study is intended to assess the effect of deep breathing and anulom vilom pranayama on prevention of postoperative pulmonary complication associated after cardiac surgery.

The theoretical framework adopted by the researcher for the present study is based on The Neuman's System Model (1996) based on Neuman's system theory.

The Neumann's system model provides a comprehensive, flexible, holistic and system based perspective for nursing. This conceptual model of nursing focuses attention on the response of the client system to actual or potential environmental stressors and the use of primary, secondary and tertiary prevention, intervention for retention attainment and maintenance of optimal client system wellness.% The Neuman's has identified stressors which can affect client system and suggests possible reaction and actual reaction with identifiable signs or symptoms may be mitigate through appropriate early interventions (neuman,1995).

The Neuman System Model depicted a client-client system and presented nursing as a profession primarily concerned with determining the proper nursing response in situations involving stressors or potential client-client system reactions.

The Neuman system model provides a way of looking at the domain of nursing; individual, environment, health, and nursing.

a. **Individual/Client**: Patients undergoing cardiac surgery, including their physiological, psychological, and spiritual dimensions, as well as their unique stressors related to surgery and recovery.

b. **Environment**: The surgical setting, including preoperative, intraoperative, and postoperative environments, as well as the social, cultural, and physical factors influencing the patient's recovery.

c. **Health**: Optimal respiratory function and prevention of postoperative pulmonary complications, such as atelectasis, pneumonia, pleural effusion and respiratory failure, as key indicators of health in this context.

d. **Nursing**: Nursing interventions aimed at promoting respiratory health, reducing stressors, and facilitating adaptation to the surgical experience and recovery process.

Major concepts of model

1. ***Central Core (Basic structure):*** it includes the individual's basic structure and factors influencing their response to stressors. In the present study basic structure represent the individual undergoing surgery and the vulnerability of their pulmonary system to postoperative complications which can be affected by their demographic and clinical variables as Age, Gender, History Of Smoking, BMI ,Medical Diagnosis, Duration Of Illness, Co-Morbidity, type of Surgery, , Type Of Anaesthesia Given, Duration Of Surgery (In Hrs.) etc.
2. ***Stressors****:* Any environmental or internal factors that challenge the stability of the individual's system. In this study stressor can be preoperative factors such as advanced age co- morbidity, intraoperative factor as duration of surgery, Postoperative factors like anaesthesia, reduced mobility, and altered respiratory function due to pain or surgical trauma.
3. ***Flexible Line of Defense:*** This represents the range of adaptability and response to stressors. The client's ability to maintain dynamic equilibrium depends on their position relative to the flexible line of defense. The client has more protection from stressors when the flexible line expands away from the normal line of defense. Anulom Vilom Pranayama can help patients expand their range of adaptability by improving lung capacity, oxygenation, and relaxation response and can further helps to reduce complications.
4. ***Normal Line of Defense***: This represents the client's usual state of health and wellness, which can vary depending on individual factors. In this study it represents the patients' usual respiratory function and immune function which may be compromised by the stress of surgery.
5. ***Lines of Resistance:*** The protective mechanisms that buffer the individual from stressors. Lines of defense are barriers that protect the client's normal state, while

lines of resistance represent the client's internal resources for managing stress. Include physiological factors such as respiratory function, immune system health, and psychological factors such as coping mechanisms stressors. Anulom Vilom Pranayama may strengthen these lines of defense by improving respiratory function, and enhancing overall physiological resilience.

6. ***Prevention as Primary Intervention:*** Neuman's model incorporates levels of prevention similar to those used in public health, with primary prevention focusing on preventing stressors, secondary prevention focusing on early detection and intervention, and tertiary prevention focusing on rehabilitation and restoration of equilibrium. In deep breathing Anulom Vilom Pranayama acts as a primary prevention strategy by addressing risk factors for postoperative pulmonary complications before they occur, by promoting lung expansion, clearance of secretions, and strengthen the individual's lines of resistance against postoperative pulmonary complications.

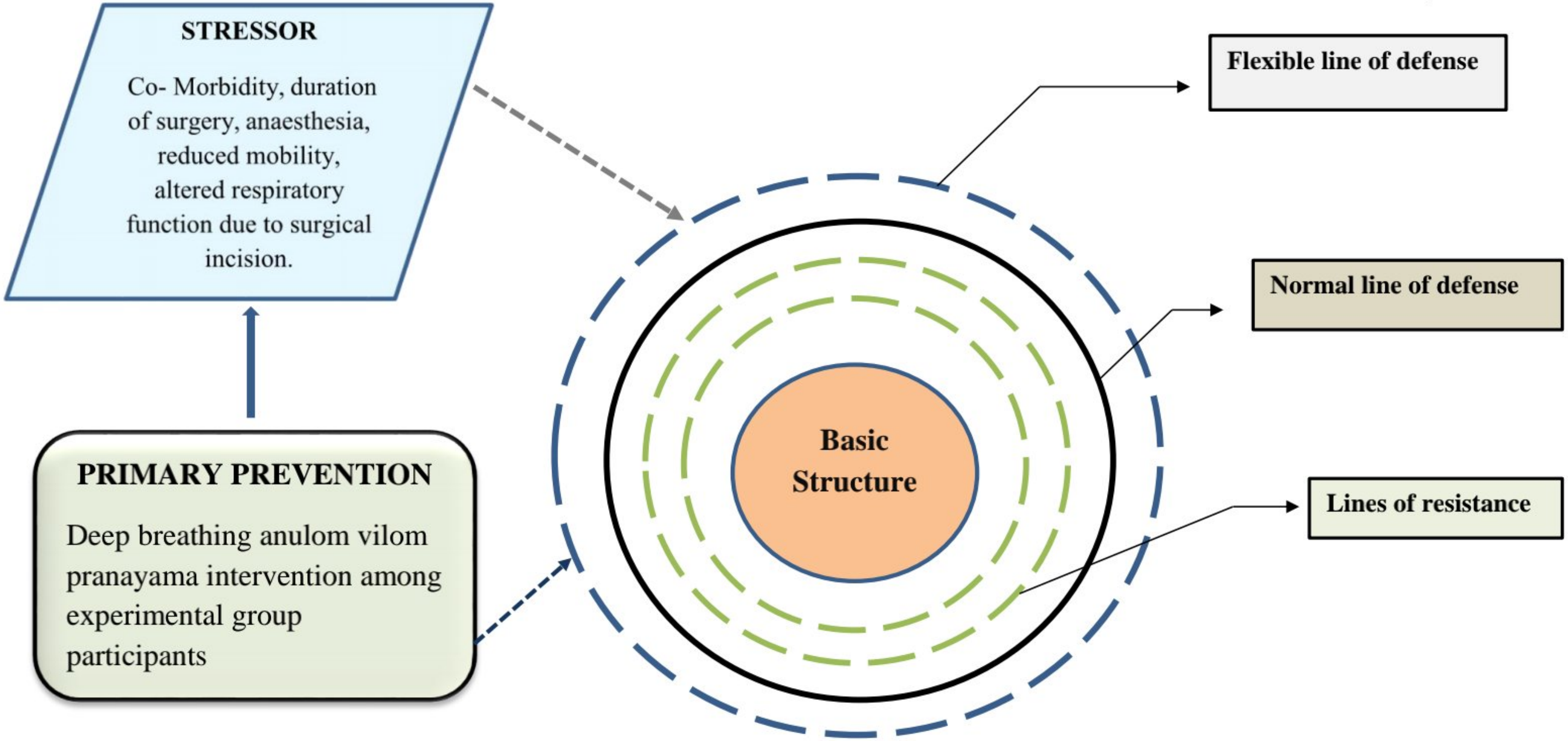
STRESSOR
Co- Morbidity, duration of surgery, anaesthesia, reduced mobility, altered respiratory function due to surgical incision.
PRIMARY PREVENTION
Deep breathing anulom vilom pranayama intervention among experimental group participants
Flexible line of defense
Normal line of defense
Lines of resistance
Basic Structure

Figure : 1 Conceptual Framework Based On Betty Neuman's System Model

Summary: This chapter dealt with background of the study, need for the study, objectives of the study, operational definition, hypothesis and conceptual framework based on Neuman's system model theory

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

The literature review is systematically conducted to contextualize a research problem and pinpoint deficiencies in prior studies. The review aims to uncover past efforts, methodologies employed by previous researcher.

- Search strategy and data sources

Literature review was conducted using following electronic databases: PubMed, Google scholar, Scopus, Science direct, various journals, research-gate Wiley Online library and Elsevier clinical key from 2000-2023 duration. Various terms and their synonyms were used in the database thesaurus. The search terms included incidence of postoperative pulmonary complications, cardiac surgeries, anulom vilom pranayama, and effect of deep breathing.

The review of literature has been organized under following section

1. Incidences of post-operative pulmonary complications
2. Effect of deep breathing
3. Effect of Anulom Vilom Pranayama
4. Effect of deep breathing and Anulom Vilom pranayama on post-operative pulmonary complication
5. Effect of deep breathing and Anulom- Vilom pranayama on respiratory parameter

1. Incidences of post-operative pulmonary complications

Postoperative pulmonary complications (PPCs) are a significant concern following surgery, contributing to increased morbidity and prolonged hospital stays. Research findings highlight the multifactorial nature of PPCs and efforts to identify and mitigate associated risks. Studies indicate that patient-specific factors play a crucial role in the incidence of PPCs.

An international multicenter prospective study was conducted by Marc-Olivier Fischer et al (2022) to report the incidence and identify risk factors for PPC's after cardiac surgery. In this study 43 cardiac surgery centers included which were located across 9 countries. It revealed that 373 out of 676 (55%) patients with the presence of PPC and 303 out 676 (45%) did not presented the PPC, the type of PPCs was varied that includes atelectasis (highest), pleural effusion, respiratory failure[7]

A retrograde observational study was conducted by Y Uqiang Wang et al (2023) to compare tools for postoperative pulmonary complication after cardiac surgery in which, clinically observed incidence of atelectasis shows higher that was (51.4%) than pneumonia (20.9%) and respiratory failure (6.5%).[10]

A systemic review investigated by Laura Pasin, MD et al. (2017) to get further insight into the true prevalence of PPC following open abdominal aortic surgery, as well as the effect of PPC on survival. There were 213 studies systemically analyzed. 10.3% was the total median incidence of PPC. Pneumonia, respiratory insufficiency, prolonged mechanical ventilation, need for unplanned mechanical ventilation, atelectasis, acute respiratory distress syndrome, pulmonary edema, and pleural effusions were the most common PPC reported in the literature. Occurrence of PPC was associated with postoperative mortality ($r = 0.65$, $p<0.01$) higher in emergency procedures ($p<0.001$) with statically significance.it is concluded that Following open abdominal aortic surgery, PPC is quite prevalent and is linked to higher rates of postoperative morbidity and mortality.[33]

A narrative review reported by A.Miskovic et al (2017) aimed to enable readers to understand better why PPCs occur, incidence, identify at-risk patients, and to suggest strategies to reduce their occurrence., This paper reviews the literature regarding PPCs ,in this PPCs occur in major surgery in a range of 1 to 23% of cases. Pulmonary complications are more common than cardiac complications, according to several studies with postoperative respiratory failure being the most common PPC.[22]

A study investigated by Chun kevin yang et al (2015) the incidence of pulmonary complications following major cardiac surgeries using (ACS-NSQIP) database, In this study overall rate of PPC was 5.8% (9596 of 165196) patient who were developed PPC were significantly with cardiac, neurologic, pulmonary, renal co morbidity and belongs to older age group compared with who did not developed PPC.[34]

The type and magnitude of surgery also influence the likelihood of PPCs. Major abdominal or thoracic surgeries, which may involve prolonged anesthesia and mechanical ventilation, pose a higher risk. Emergency surgeries and procedures with a prolonged duration further contribute to the increased incidence of postoperative pulmonary complications. Research underscores the importance of preventive measures to reduce PPCs. Preoperative optimization of respiratory function through smoking cessation, pulmonary rehabilitation, and targeted interventions for patients with chronic lung diseases has shown efficacy. Intraoperative strategies, such as lung-protective ventilation strategies and minimally invasive surgical techniques, aim to minimize the impact on respiratory function.

2. Effect of deep breathing in postoperative period

Research studies consistently highlight the positive effects of deep breathing on physical and mental well-being. Deep breathing, or diaphragmatic breathing, involves slow and deliberate inhalation, allowing the diaphragm to fully expand. This practice triggers various physiological responses**.** Studies indicate that deep breathing promotes relaxation by activating the parasympathetic nervous system, leading to reduced stress hormones and a lower heart rate. This, in turn, contributes to stress and anxiety reduction. Moreover, deep breathing enhances respiratory function, increasing lung capacity and efficiency. Research suggests it can be beneficial for individuals with respiratory conditions such as asthma or chronic obstructive pulmonary disease (COPD).

A prospective randomized control trial conducted by Westerdahl et al. (2005) to investigate the effect of deep breathing exercise on pulmonary function and atelectasis after CABG surgery. In this study total 90 participants were participated out of them 48 in experimental group who were performed deep breathing exercise compared to control group participants who were not gone through any intervention. Spiral CT scan of 4th POD suggested atelectasis was only half the size in experimental group compared to control group. In experimental group 72% of patients experienced subjective benefits of DBE significantly reduced atelectasis and improved pulmonary function by enhancing lung expansion.

A systematic review was noted by Overend et al. (2001) in Entitled "The effect of incentive spirometry on postoperative pulmonary complications" concluded that incentive spirometry and deep breathing resulted in improved lung volumes and oxygenation in postoperative patients

3. Effect of Anulom Vilom Pranayama

An extensive review of literature reveals a growing body of research exploring the effects of Anulom Vilom Pranayama, a yogic breathing technique. Studies consistently highlight its positive impact on physiological and psychological well-being. Research suggests that regular practice of Anulom Vilom Pranayama can contribute to improved respiratory function, with increased lung capacity and enhanced oxygenation.

A Prospective comparative randomized study conducted by Smita Jaiman et al**.** (2019) to compare the PEP and anulom vilom pranayama in 30 participants of uncomplicated CABG surgery. In this study 2 groups were made group A with intervention of AVP with incentive spirometry and group B with intervention of PEP (positive expiratory pressure) along with incentive spirometry. In the result they found group a participants who have gone through AVP, found more effective in improving respiratory functions, mucociliary functions in CABG cases.[35]

a randomized control trial conducted Baljinder Singh Bal (2010) to examine the effects of anulom vilom and bhratrika pranayama on vital capacity and maximal ventilary volume ,in which 30 participants are randomly selected in experimental And control group , the participants of experimental group done AVP and bhrastrika prananyama sessions 50min. daily for 8 weeks. In the result the experimental group's vital capacity on the pretest and posttest had mean values of 2.590 and 3.218, respectively, while the mean of The critical capacities for the control group's pre-test and post-test were 2.767 and 2.785,respectively.Thus it may be concluded that eight week pranayama training program showed significant improvement in vital capacity[36]

4. Effect of deep breathing and anulom vilom parnayam on post-operative pulmonary complication

A comprehensive review of literature on the effects of deep breathing exercises, specifically Anulom Vilom Pranayama, on postoperative pulmonary complications reveals promising insights. Surgical procedures often pose a risk of respiratory complications, and interventions targeting respiratory well-being are of paramount importance in postoperative care.

Studies consistently highlight the positive impact of deep breathing exercises on mitigating postoperative pulmonary complications. Deep breathing exercises, including Anulom Vilom Pranayama, have been associated with improved lung function and reduced incidences of atelectasis and pneumonia following surgery.

A prospective randomized control trial conducted by Elisabeth westerdhal. et.al., in which 48 participants in experimental group performing deep breathing exercises and 42in control group who are not performing any exercises postoperatively ,in which they found that Deep-breathing exercises can reduce atelectasis and improve pulmonary function after coronary artery bypass surgery, with 72% of patients experiencing a subjective benefit.[23]

A study by Birgitta lindmark et.al reported that Deep breathing exercises after cardiac surgery significantly decrease atelectasis and area affected to atelectasis increase aerated lung area, and slightly increase PaO2, with no significant difference between breathing techniques.[24]

An observational study conducted by Yanez brage at al. on 263 patients revealed that preoperative deep breathing exercise and assisted coughing are associated to lower incidence of atelectasis after CABG.[26]

A study reported Henderson,Y. suggested that Deep breathing induced by carbon dioxide inhalation effectively prevents atelectasis and postoperative pneumonia, reducing the risk of postoperative complications.[25]

a randomized controlled trial study conducted Westerdahl et al. (2005) aimed to evaluate the impact of deep-breathing exercises on atelectasis and pulmonary function post-coronary artery bypass surgery (CABG). This study comparing two groups: one receiving deep-breathing exercises and another control group. Lung function and atelectasis were assessed using imaging techniques and spirometry. The group performing deep-breathing exercises showed significantly reduced atelectasis and improved pulmonary function compared to the control group.[32]

Deep breathing exercises have demonstrated their efficacy in improving lung expansion, preventing atelectasis, and enhancing postoperative recovery in patients undergoing cardiac surgeries. These exercises should integral components of postoperative care plans, facilitating better respiratory function and reducing the risk of complications. Their inclusion in the recovery process emphasizes their significance in promoting optimal pulmonary health after surgery.

5. Effect of deep breathing and anulom- vilom on respiratory parameter

Research on the impact of deep breathing and Anulom Vilom Pranayama on respiratory parameters consistently underscores their positive effects. Studies consistently report improvements in respiratory function, including increased lung capacity and enhanced pulmonary function tests. Regular practice of deep breathing exercises, such as Anulom Vilom Pranayama, has been associated with a positive influence on vital capacity, tidal volume, and forced expiratory volume.

a prospective randomized controlled study undertaken by Azeez AM, Puri GD et al. noted that participants undergone cardiac surgery The yoga group (including anulom vilom pranayama intervention) experienced a significant decrease in the average length of their ICU stay (32.60 ± 14.31 versus 67.6 ± 37.39 h, P = 0.004) as compared to the control group.[27]

A prospective study conducted by Arzu et al.(2008) to look into the hemodynamic and respiratory reactions to deep breathing exercise (DBE) in the intensive care unit during the post-major head and neck surgery follow-up phase. Thirty-five patients were instructed to perform DBE every hour for 3 consecutive hours during the first postoperative day. DBE led to an increase in SpO_2 from 97.4 ± 1.9 to 99.2 ± 0.9 mm Hg and a PaO_2/FiO_2 ratio from 416.7 ± 143.6 to 453.4 ± 141.4 mm Hg. DBE reduced the RR to 21.8 ± 2.9 from 24.1 ± 3.3 ($P < 0.05$). Following significant head and neck surgery, DBE increases oxygenation without having an adverse effect on hemodynamics.[37]

While the existing literature is generally favorable, it's crucial to note variations in study designs, populations, and durations of intervention. Additionally, more high-quality, randomized controlled trials are needed to establish definitive conclusions on the specific effects of deep breathing and Anulom Vilom Pranayama on respiratory parameters across diverse populations. Overall, the available evidence suggests that these practices hold promise in optimizing respiratory function and may be valuable components of respiratory rehabilitation and wellness programs

Summary: this chapter dealt with literature reviews related to incidence of PPC's, effect of deep breathing and anulom vilom on PPC's and on other parameters.

CHAPTER III

METHODOLOGY

CHAPTER III

METHODOLOGY

Research methodology is a structured approach for methodically addressing research problem, serving as the framework to investigate and understand scientific research processes.

This chapter explains method adopted by the researcher to conduct this study. It includes research approach, research design, research variables, setting of the study, sample, data collection tools/instruments ,description of intervention , ethical considerations ,procedure of data collection etc.

Research Approach

A research approach encompasses a strategic blueprint used by the researcher to establish the most effective techniques for gathering, analyzing, and interpreting data. It serves as the foundational framework that guides the researcher in producing precise and comprehensible information. [15]

In this study quantitative approach was adopted to achieve the objectives of the study.

Research Design

Experimental study design (Randomized Control Trial) was adopted for the present study. It was a Randomized Control Trial design with balanced randomization (allocation ratio was 1:1)

Randomization

Simple randomization with allocation ratio 1:1 was used for study.

Randomization sequence was created by computer generated randomization list with the help of www.randomization.com. Allocation concealment was done to minimize the selection bias of the researcher. Allocation concealment mechanism adopted was sequentially numbered, Opaque sealed envelopes (SNOSE). Each envelop contained the intervention to be performed to the study participant which was unknown to the research. After enrolling the study participants, group (experimental or control group) assignment was ascertained by opening the sealed envelop.

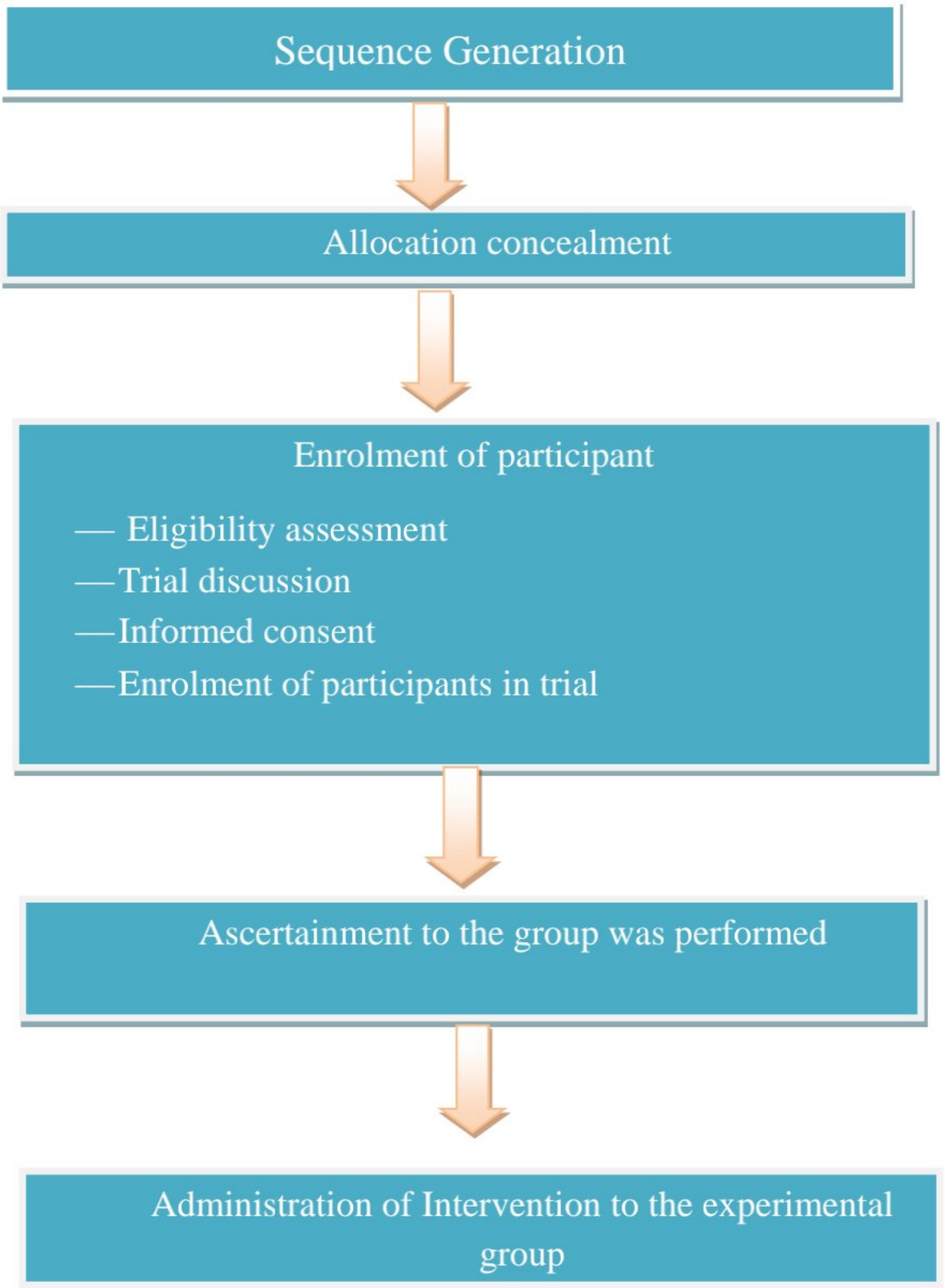
Sequence Generation
Allocation concealment
Enrolment of participant
— Eligibility assessment
—Trial discussion
—Informed consent
—Enrolment of participants in trial
Ascertainment to the group was performed
Administration of Intervention to the experimental group

Figure 2: Flow diagram showing randomization process

SNOSE Process :

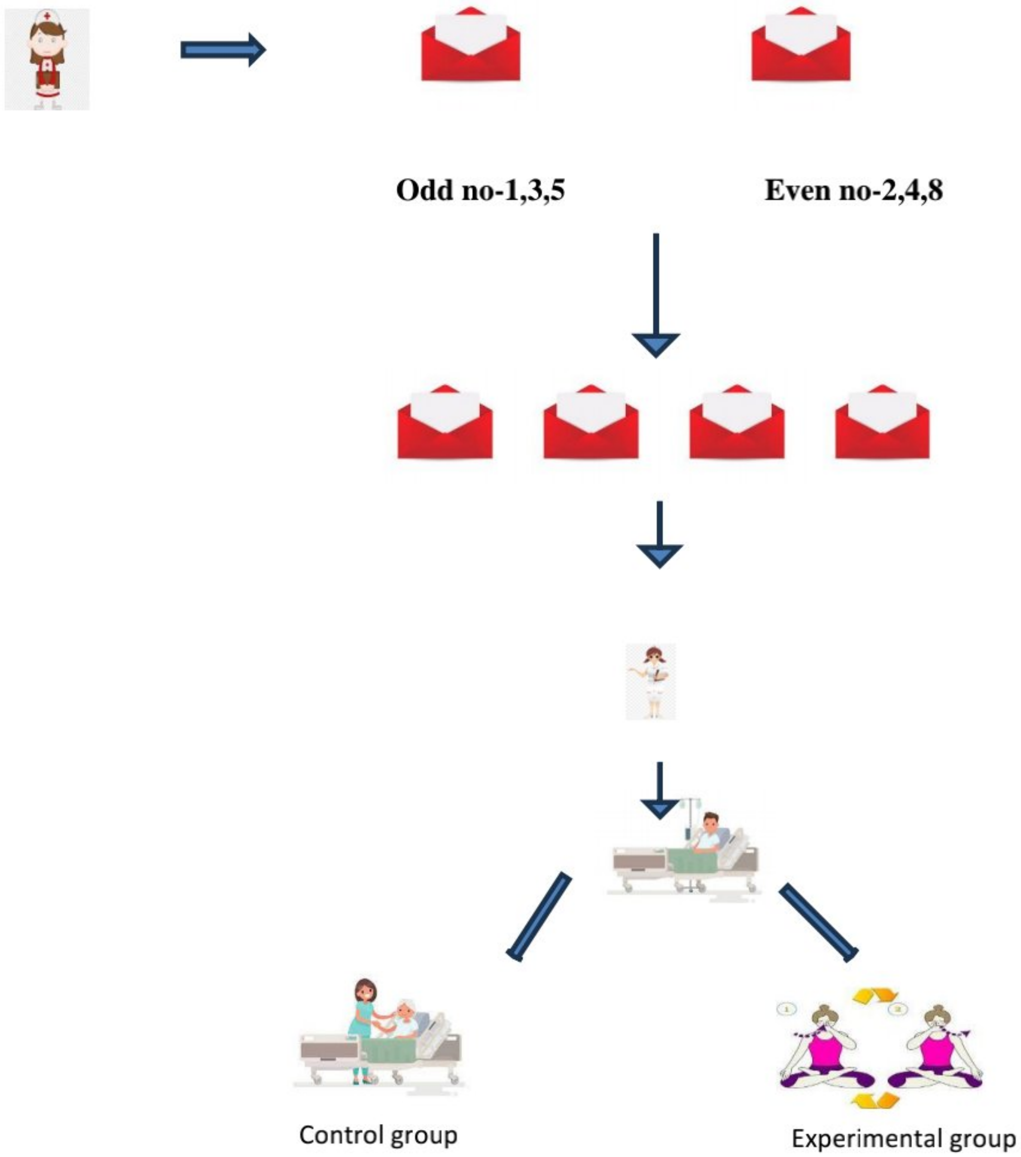
Odd no-1,3,5
Even no-2,4,8
Control group
Experimental group

Fig 3 : figure showing the Sequentially Numbered, Opaque Sealed envelopes (SNOSE) Process

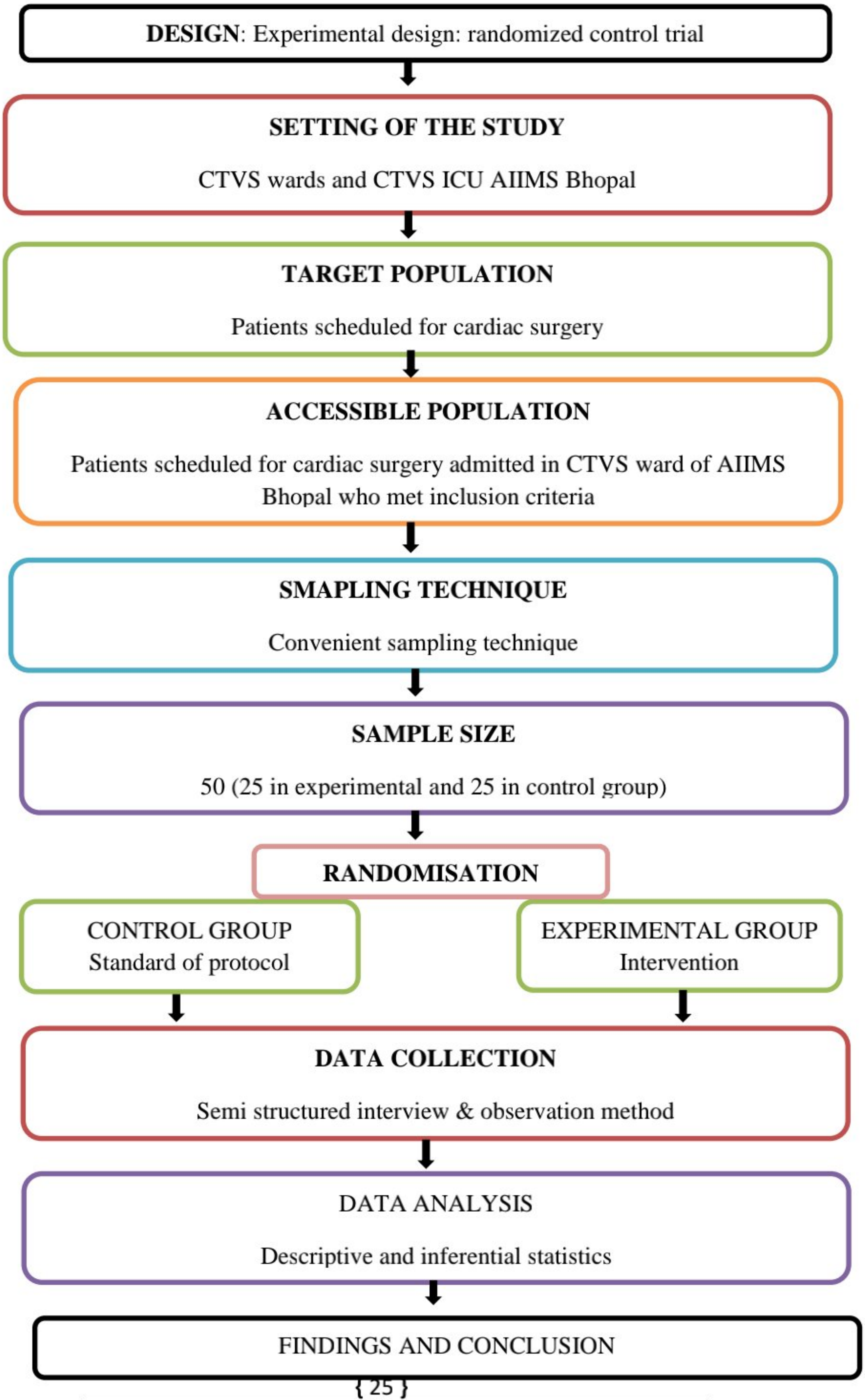
DESIGN: Experimental design: randomized control trial
SETTING OF THE STUDY
CTVS wards and CTVS ICU AIIMS Bhopal
TARGET POPULATION
Patients scheduled for cardiac surgery
ACCESSIBLE POPULATION
Patients scheduled for cardiac surgery admitted in CTVS ward of AIIMS Bhopal who met inclusion criteria
SMAPLING TECHNIQUE
Convenient sampling technique
SAMPLE SIZE
50 (25 in experimental and 25 in control group)
RANDOMISATION
CONTROL GROUP
Standard of protocol
EXPERIMENTAL GROUP
Intervention
DATA COLLECTION
Semi structured interview & observation method
DATA ANALYSIS
Descriptive and inferential statistics
FINDINGS AND CONCLUSION

Fig.4 Schematic Presentation of Research Design

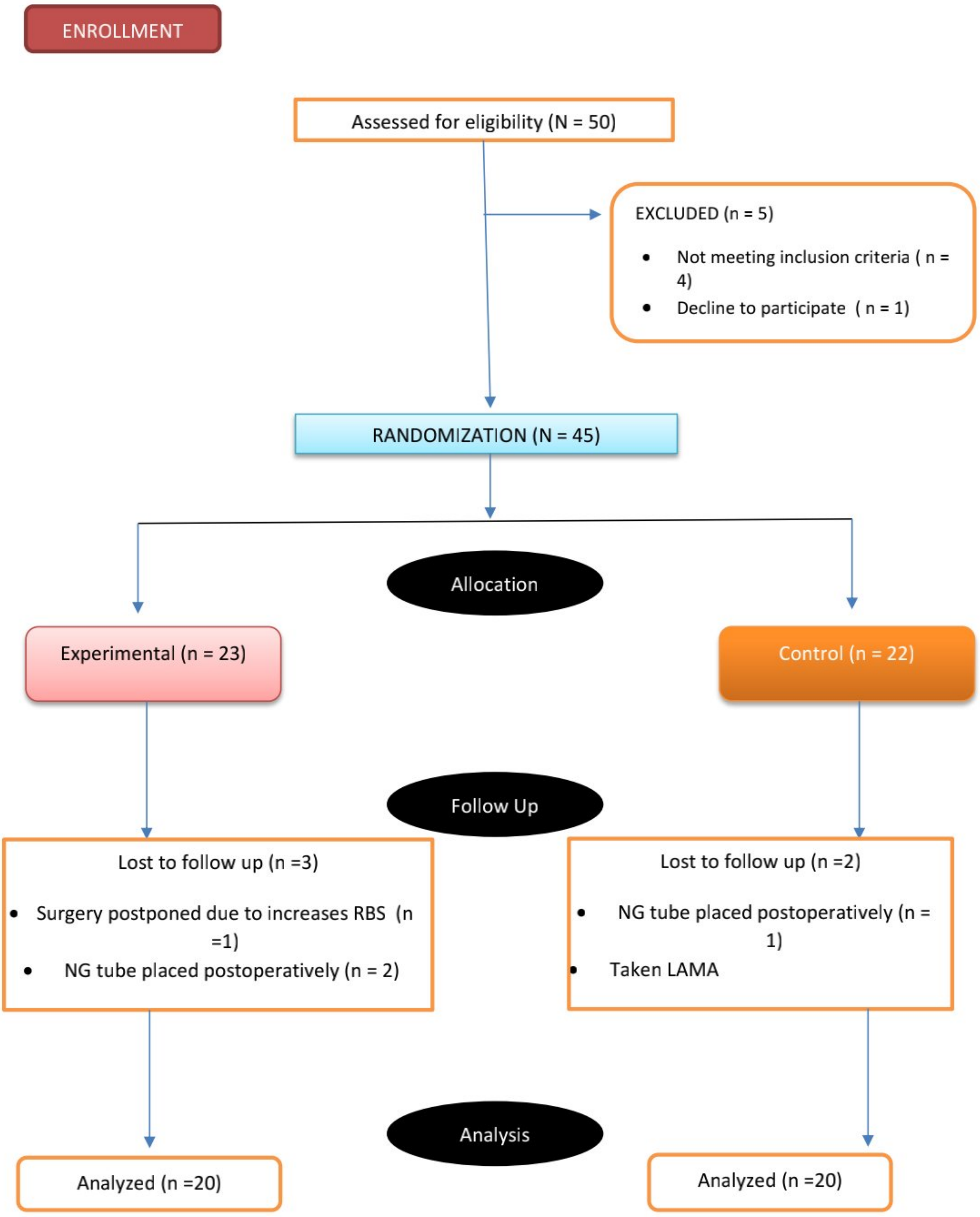
ENROLLMENT
Assessed for eligibility (N = 50)
EXCLUDED (n = 5)
Not meeting inclusion criteria (n = 4)
Decline to participate (n = 1)
RANDOMIZATION (N = 45)
Allocation
Experimental (n = 23)
Control (n = 22)
Follow Up
Lost to follow up (n =3)
Surgery postponed due to increases RBS (n =1)
NG tube placed postoperatively (n = 2)
Lost to follow up (n =2)
NG tube placed postoperatively (n = 1)
Taken LAMA
Analysis
Analyzed (n =20)
Analyzed (n =20)

Fig. 5 Consort diagram of patient screening and allocation

Research Variables

1) Independent variables:

Deep breathing and anulom vilom pranayama

2) Dependent variable:

Post-operative pulmonary complications

That includes – atelectasis
Pulmonary edema
Pleural effusion
Pneumonia

3) Sociodemographic variables:

Sociodemographic variables assessed in the study included Age, Gender, and Educational status, occupation, religion, habits of yoga, residential area, type of family, income, smoking habits, BMI, dietary pattern of the study participants.

4) Clinical variables:

Clinical variables assessed in the study are medical diagnosis, duration of illness, co – morbidity , name of surgery , history of previous surgery , type of anaesthesia given, duration of surgery , length of ICU stay post-surgery etc.

Research Setting:

The study was conducted in CTVS wards and CTVS ICU, AIIMS BHOPAL.

Population:

The target population were patient’s undergone cardiac surgery at AIIMS Bhopal.

Sample:

i. **Inclusion and Exclusion criteria**

Inclusion criteria

- 18 years and above
- Willing to participate in the study
- Patients scheduled for surgery in CTVS ward.

Exclusion criteria

- Below 18 years.
- patients with cognitive or neurological deficit
- patients with coexisting acute or chronic respiratory disorders
- Patient with nostril injury /nasal surgery /NG tube placed.

ii. Sample size – 50

iii. Sampling technique : Convenient sampling Technique – a type of non-probability sampling

Data collection tool and instruments:

i. **Development and descriptions of tools**

The tool of the study was developed after doing extensive literature study and consultation with nursing experts.

The following steps were undertaken in tool development;

1. Extensive review of literature regarding cardiac disorder, cardiac surgeries and postoperative pulmonary complications and factors that can affect primary and secondary outcome.
2. Development of sociodemographic and clinical profile sheet based on literature review.

3. Content validation
4. Tool modification based on the suggestions of guide, co guide and experts
5. Tool translation into regional language (Hindi) and consultation with language expert
6. Reliability testing
7. Finalization of tool

Screening tool is also developed to evaluate the subjects for inclusion and exclusion criteria and to assess the eligibility to participate in the study

Tool of the study includes, Participant identification number and date followed by 3 sections;

Section A: Sociodemographic profile:

It is a semi-structured sheet consists of Age (In Years), Gender Educational ,Status Occupation, Religion ,Habit Of Yoga And Exercises, Residential Area ,Type Of Family ,Monthly Income Of Family ,History Of Smoking ,BMI ,Dietary pattern.

Section B: Clinical profile sheet

It is a semi-structured sheet consists of Medical Diagnosis, Duration of Illness, Co-Morbidity, Name of Surgery, History of Any Previous Surgery, Type of Anesthesia Given, Duration of Surgery (In Hrs.), Length of ICU Stay Post Surgery.

Section C: Observation checklist

It consists of Atelectasis, Atelectasis, Pleural Effusion, and Pneumonia that is evaluated by x-ray analysis by expert doctors in the field.

ii. Validity and reliability of tools

Validity

Content validity of tool was obtained from 10 experts in the field of Nursing, Medicine and AYUSH department.

Individual Item Content Validity Index (I-CVI) was calculated by taking the opinion of score 3 and 4 (highly relevant) and Scale Content Validity Index (S-CVI) calculated by taking average of I-CVI

Acceptable range of I-CVI is 0.78 or above and S-CVI is .90 or above for > 9 experts.

All items in sociodemographic sheet, clinical profile sheet and observation checklist sheet having I-CVI greater than 0.78 and S-CVI greater than .90

Table No. 1 Showing content validity index of tool (Section – A, B and C)

Content Validity Index	Sociodemographic sheet	Clinical profile sheet	Observation checklist
Item Content Validity Index (I-CVI)	0.985	1	0.96
Scale Validity Index (S-CVI)	0.98	1	0.96

Reliability

Reliability of tool was established by inter-rater method on 4 study participants And the % agreement value found **0.95** that is inacceptable range (**>0.7**).

iii. Technique of data collection

Data was collected by semi-structured interview and observation method. Sociodemographic data and clinical profile data were collected by questioning technique. Certain clinical information was gathered from the participant's treatment file, including the name of the surgery, the duration of surgery in hrs. and the type of anaesthesia given . These data collected in both preoperative and postoperative period accordingly.

Descriptions of Intervention

Deep breathing exercise involving slow, deep inhalation through the nose, followed by a prolonged exhalation through pursed lips or the mouth. This technique aims to promote expansion of the lungs and increase oxygenation.

Anulom vilom pranayama is a specific form of controlled breathing originating from traditional yoga practices, involving alternating nostril breathing. It typically consists of inhaling through one nostril while blocking the other, followed by exhaling through the alternate nostril.

Preparation before the intervention

Patient preparation

- Greet the patient and introduce yourself.
- Place the patient in comfortable sitting position.

- Explain the procedure to the patient and instruct them to observe while demonstration will give.

Environment preparation

- Area should be well lighted and room should be warm enough to be comfortable for the client
- Time should be convenient for investigator and participants.
- Positioning of the client in upright position.

PHASE –I Deep breathing (3min.)

The participants were instructed to sit comfortably with straight spine and close the eyes and relax the whole body.

- Observe the natural and spontaneous breathing process
- Next ,Instructed to inhale quickly for count of 4 and deeply and exhale slowly and completely up to count of 4 , It is one round , repeated for 12 round
- Then open your eyes and take a rest of 30-60 sec.

PHASE-II Anulom vilom pranayama [38] (5-7 min.)

- Participants were instructed to breathe slowly using alternate nostril.
- Each breathing cycle comprised inspiration (four counts), expiration (four counts) and follow the following protocol.
- Close the right nostril with the thumb and inhale deeply through the left nostril for a count of four until the inhalation ends comfortably.
- Close the left nostril with the help of ring finger, release the thumb from the right nostril and exhale through the right nostril up to a count of four.

- Next, inhale deeply through the right nostril, keeping the same count in the same manner.
- Close the right nostril with the thumb and exhale through the left nostril up to a count of four.
- This is one round.
- Practice 10 rounds

Ethical consideration

Detailed thesis protocol was submitted to the institutional Human Ethics Committee-Student Research (IHEC-SR) for approval on 13TH January 2022 and letter of permission (LOP) form IHEC-SR got on 13TH March 2022 with reference number (Ref no.:AIIMS/BPL/IHECSR/July/22/MscN/12). Permission was obtained from principal, Nursing College, Head of all medical and surgical departments and medicals superintendent (Annexure I) for conducting the study. Intimation was given to all the Head of the departments and Senior Nursing officers prior to pilot and main study. Participant's information sheet was prepared, explained and given to all the participants. Privacy, anonymity and confidentiality of data were assured

Pilot study

Pilot study was conducted in CTVS wards and CTVS ICU of AIIMS Bhopal for a period of two weeks from 25th sep. 2023to 15th oct. 2023.Patient who met the inclusion criteria were selected using convenient sampling technique which is type of non probability sampling technique. 6 subjects were selected conveniently and were randomly allocated to Experimental group 1 and Experiment group 2 with allocation ratio 1:1, using computer generated randomization list generated from www.randomization.com Allocation concealment mechanism used in the present study was sequentially numbered, Opaque sealed envelopes (SNOSE) to minimize researcher selection bias. Intervention was provided by the research only. Experimental group (1) was given with demonstration of deep breathing and anulom vilom pranayama 2 times day for 5 days in preoperative period and for 3 days in postoperative period. Control group (2) was given with routine conventional care as per SOP. On the 5th postoperative day routine x-ray film was obtained and evaluated by expert. During pilot study practicability of the tool, feasibility of study and intervention efficacy was assessed.

Procedure of data collection:

The main data was collected from CTVS ward AIIMS Bhopal. Patient were selected on the basis of inclusion and exclusion criteria with the screening tool. Informed consent was obtained after full disclosure of the study to the participants. 50 subjects were selected using convenient sampling technique with the help of computer generated randomization list , subject were allocated to experimental and control group equally with allocation ratio 1:1. Subject in experimental group performed deep breathing and anulom vilom pranayama for 5 days in preoperative period and 3 days in postoperative period in 2 times a day (morning and evening). Data collection procedure included semi- structured interview and observation. Socio –demographic data and clinical profile data was obtained from semi-structured interview and from patient's treatment file. Observation checklist regarding PPC's filled by CTVS surgeon as evaluated by a chest x-ray film at 5th postoperative day.

Procedure of data collection

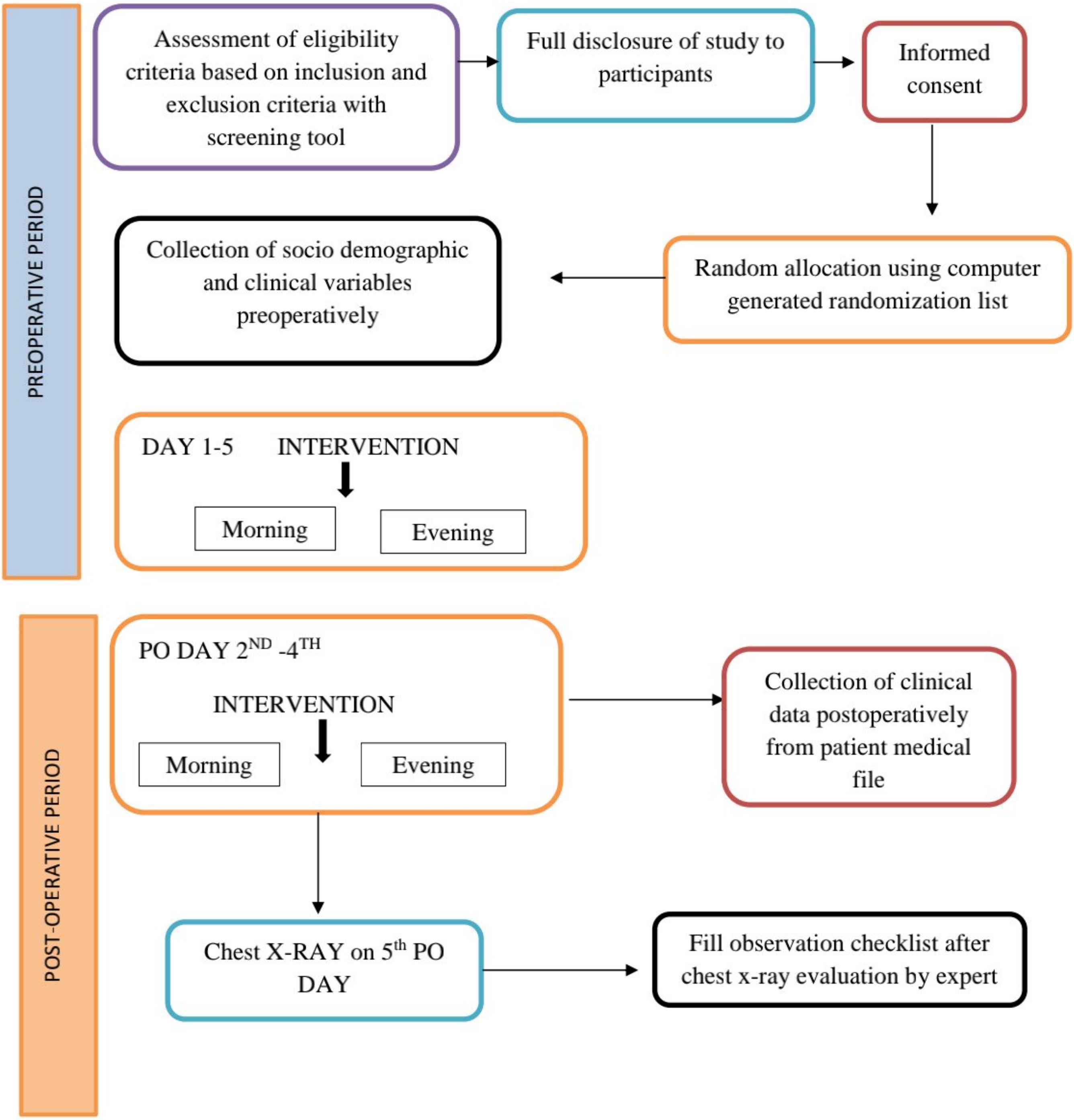
PREOPERATIVE PERIOD
Assessment of eligibility criteria based on inclusion and exclusion criteria with screening tool
Full disclosure of study to participants
Informed consent
Random allocation using computer generated randomization list
Collection of socio demographic and clinical variables preoperatively
DAY 1-5
INTERVENTION
Morning
Evening
POST-OPERATIVE PERIOD
PO DAY 2ND -4TH
INTERVENTION
Morning
Evening
Collection of clinical data postoperatively from patient medical file
Chest X-RAY on 5th PO DAY
Fill observation checklist after chest x-ray evaluation by expert

Fig.6 diagram showing procedure of data collection in experimental group

Plan for data analysis

Plan for data analysis includes descriptive and inferential statistics

The statistical methods applied for data analysis were:

- Frequency and percentage distribution was used for describing sample characteristics
- Fisher exact test / chi square test was used to established homogeneity regarding socio demographic and clinical variable among experimental and control group.
- Shapiro wilk test used to check the normal distribution of data in both groups.
- Chi square / fisher exact and t-test test was used to check the effective of intervention by comparing both the groups for primary and secondary outcome of the study.
- Chi square test to find the association between PPCs and selected sociodemographic and clinical variables.

Summary: this chapter has dealt with the research methodology which comprises of research approach, research design, randomization method , SNOSE process, research setting, and variables under study, population, sampling techniques, development of tool, validity , reliability of the tool, description of tool, pilot study, data collection and plan for data analysis.

CHAPTER IV

RESULT

CHAPTER IV

RESULT

This chapter deals with the analysis and interpretation of collected data to assess the effect of deep breathing and anulom vilom pranayama on postoperative pulmonary complication.

The investigator applied both descriptive and inferential statistics for analyzing collected data. After entering the collected data to Microsoft excel, checking and editing of raw data. Entire data checked for missing data then coding done and analysis was done using SPSS ver.20. The study result were analyzed, tabulated and presented based on data obtained from patients as primary and secondary outcomes.

The obtained data were classified as sections as followed

Section – I

- Frequency and percentage distribution and homogeneity testing of sociodemographic profile of study sample.

Section –II

- Frequency and percentage distribution and homogeneity testing of clinical variables of study sample.

Section – III

- Effectiveness of the intervention (deep breathing and anulom vilom pranayama.

Section – IV

- Association of postoperative pulmonary complication with selected socio-demographic and clinical variables.

SECTION I

Frequency and percentage distribution and homogeneity testing of sociodemographic profile of study sample

This section contain frequency and percentage distribution of socio-demographic variables of study participants in experimental and control group

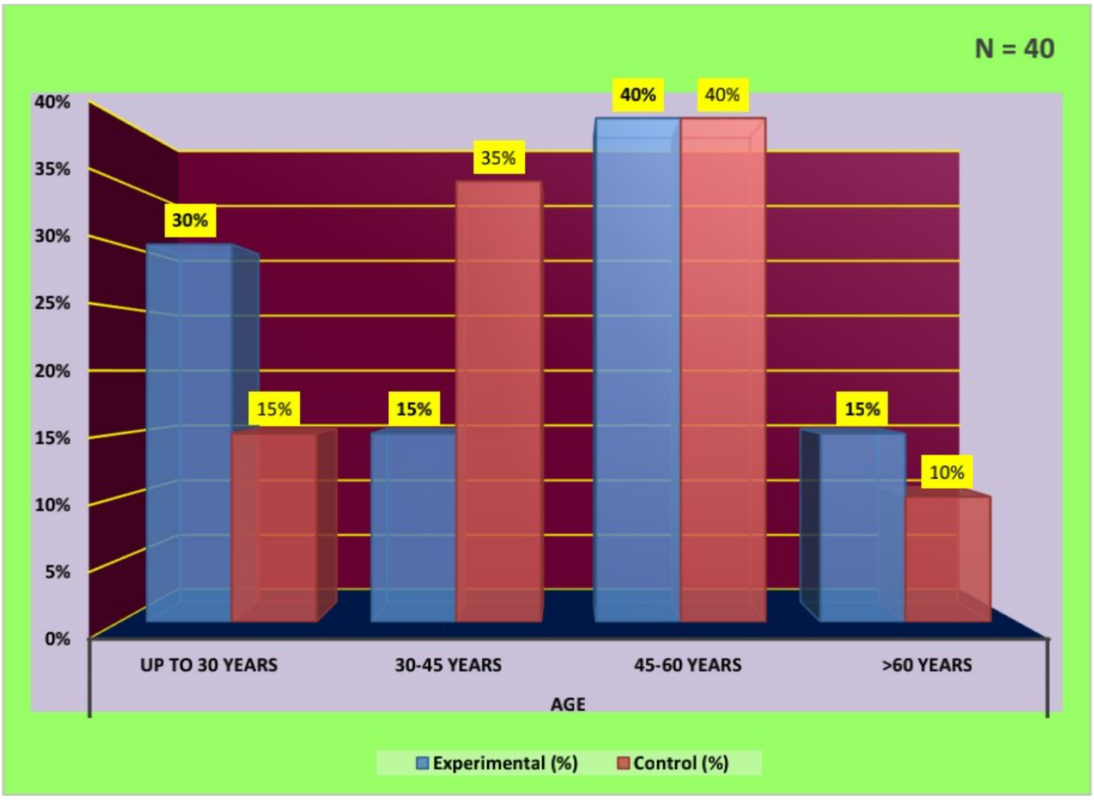

Figure: 7 Frequency Distribution of Age in Experimental and control

Figure 7 and table 2 shows distribution of age in experimental and control group. Most of the study participants belonged to age group 45-60 (40% in Experimental group and 40% in control group) followed by age group 30-45 years (15% in Experimental group and 35% in control group) and then up to 30 years (30% in Experimental group and 15% in control group).Least subjects fallen to the age category of greater than 60 years which was 15% in Experimental group and 10% in control group.

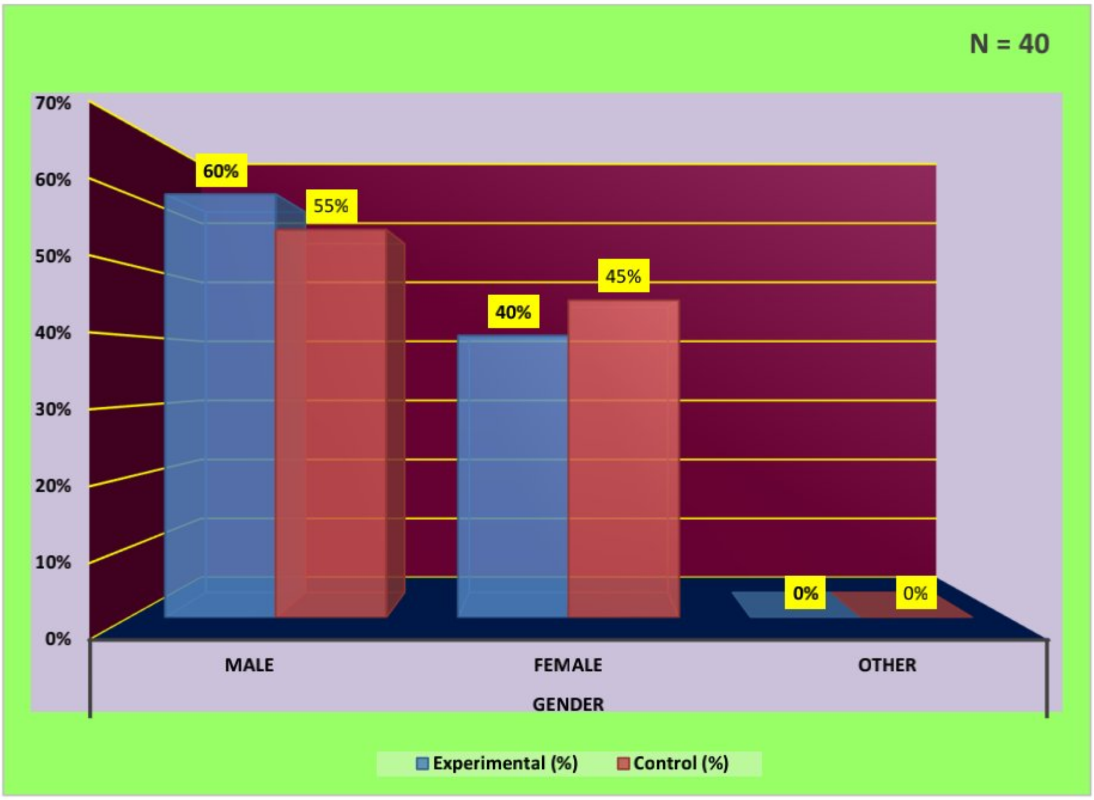

Figure: 8 Percentage Distribution of gender in Experimental and control group

Figure 8 and table 2 shows gender distribution in Experimental and control group from Fig. 8 it is clear that predominate gender in Experimental group is male (60%) followed by female (55%).But most of the participants in control group is female (45%) followed by male (40%)

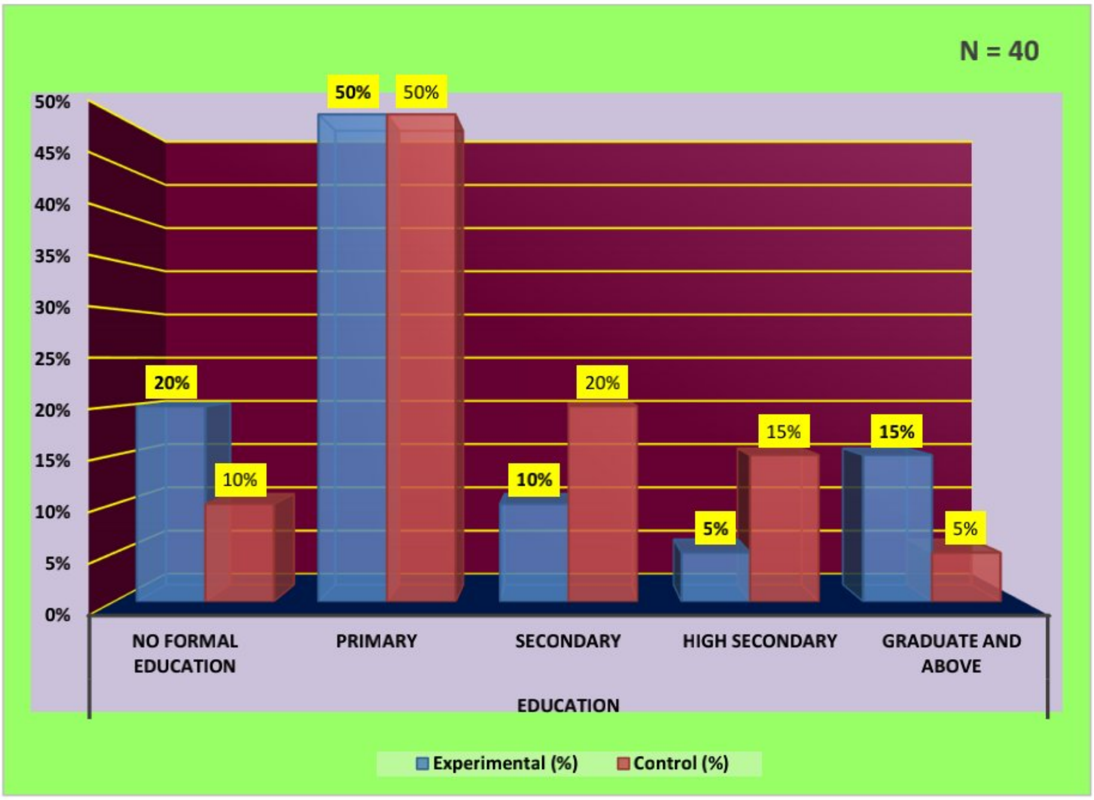

Figure: 9 Percent Distribution of Education in Experimental and control

Figure 9 and table 2 shows distribution of educational level in experimental and control group ,Most of the study participants completed primary education (50% in Experimental group and 50% in control group) followed by having no formal education (20% in Experimental group and 10% in control group) and then secondary education (10% in Experimental group and 20% in control group).Least subjects fallen to High secondary education (5% in experimental group and 15% in control group) and participants having graduate and above (15% experimental group and 5 % control group)

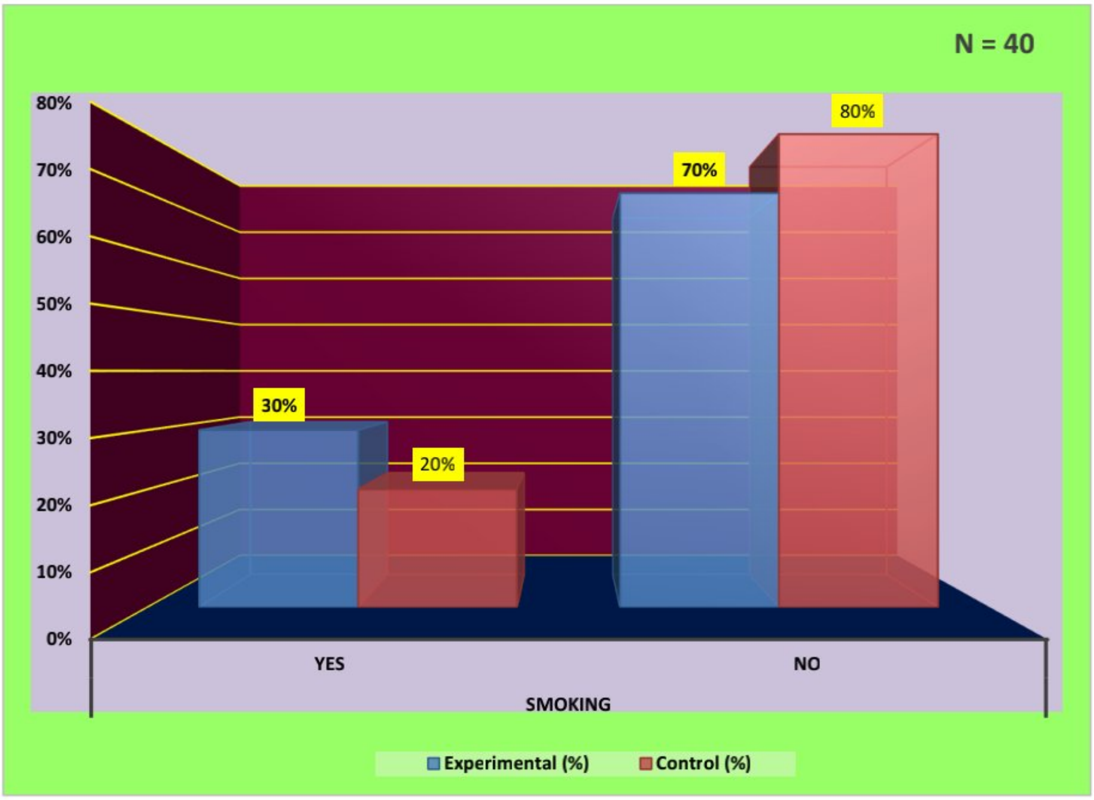

Figure: 10 Distribution of smoker in Experimental and control group

Figure 10 and table 2 shows percent distribution of smoking habits among experimental and control group participants, Most of the study participants are nonsmoker (70% in Experimental group and 80% in control group) and 30% participants are smoker in Experimental group and 20% are in control group.

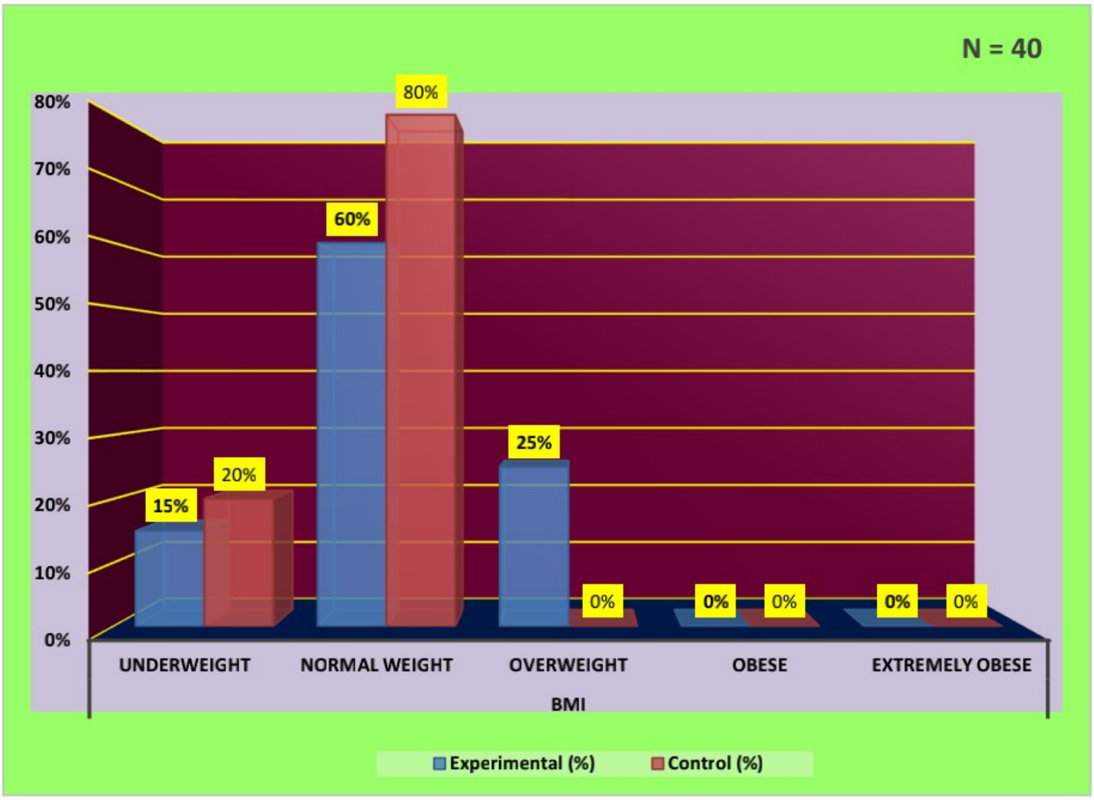

Figure: 11 Percent Distribution of BMI in Experimental and control group

Figure 11 and table 2 shows distribution of BMI in experimental and control group in which most of the study participants are in normal weight (60% in Experimental group and 80% in control group) followed by underweight (15% in Experimental group and 20% in control group) and then overweight (25% in Experimental group and 0% in control group). No participants are in obese and extremely obese group.

Table 2

Frequency and percentage distribution and homogeneity testing of sociodemographic profile

N = 40

Variables	Experimental (%)	Control (%)	Experimental (20)	Control (20)	Chi Test	df	P Value
Age							
Up to 30 Years	30.0%	15.0%	6	3	2.800	3	0.423
30-45 Years	15.0%	35.0%	3	7			
45-60 Years	40.0%	40.0%	8	8			
>60 Years	15.0%	10.0%	3	2			
Gender							
Male	60.0%	55.0%	12	11	0.102	1	0.749
Female	40.0%	45.0%	8	9			
Other	0.0%	0.0%	0	0			
Education status							
No Formal Education	20.0%	10.0%	4	2	3.333	4	0.504
Primary	50.0%	50.0%	10	10			
Secondary	10.0%	20.0%	2	4			
High Secondary	5.0%	15.0%	1	3			
Graduate And Above	15.0%	5.0%	3	1			
Occupation							
Home Maker	35.0%	65.0%	7	13	7.558	3	0.056
Laborer	25.0%	5.0%	5	1			
Professional	15.0%	0.0%	3	0			
Other	25.0%	30.0%	5	6			
Religion							
Hindu	95.0%	100.0%	19	20	1.026	1	0.311
Muslim	5.0%	0.0%	1	0			
Christian	0.0%	0.0%	0	0			
Other	0.0%	0.0%	0	0			
Habit of Yoga and Exercise							
Yes	15.0%	5.0%	3	1	1.111	1	0.292
No	85.0%	95.0%	17	19			

Cont…….table 2 Frequency and percentage distribution and homogeneity testing of sociodemographic profile

Variables	Experimental (%)	Control (%)	Experimental (20)	Control (20)	Chi Test	df	P Value
Residence							
Urban	30.0%	45.0%	6	9	0.960	1	0.327
Rural	70.0%	55.0%	14	11			
Slum	0.0%	0.0%	0	0			
Type of Family							
Nuclear	50.0%	45.0%	10	9	1.053	2	0.591
Extended	0.0%	5.0%	0	1			
Joint	50.0%	50.0%	10	10			
monthly Income of family (according to kuppuswami scale)							
<9226	45.0%	35.0%	9	7	1.850	4	0.763
9232-27648	30.0%	45.0%	6	9			
27654-46089	15.0%	15.0%	3	3			
46095-68961	5.0%	0.0%	1	0			
68967-92195	5.0%	5.0%	1	1			
Habit of Smoking							
Yes	30.0%	20.0%	6	4	0.533	1	0.465
No	70.0%	80.0%	14	16			
Body mass index (BMI)							
Underweight	15.0%	20.0%	3	4	5.714	2	0.057
Normal Weight	60.0%	80.0%	12	16			
Overweight	25.0%	0.0%	5	0			
Obese	0.0%	0.0%	0	0			
Extremely Obese	0.0%	0.0%	0	0			
Dietary pattern							
Vegetarian	60.0%	80.0%	12	16	2.390	2	0.303
Non-Veg	35.0%	20.0%	7	4			
Vegan	5.0%	0.0%	1	0			

As shown in table 2 Majority of participants are homemaker in both the groups (35% in experimental and 65% in control group) Majority of participants belongs to Hindu religion in both the groups (95% in Experimental and 100 % in control group) Majority of participant in both the groups were living in rural area (Experimental - 70% and Control- 55%) Majority of participants are vegetarian in diet in both the group (Experimental- 60 % and control-80 %).

p value ($p > 0.05$) suggest that there is no significant difference in experimental and control group regarding sociodemographic variables as age, gender , educational status , occupation, religion , habit of yoga and exercise, residence , type of family , monthly income, habit of smoking ,BMI and dietary pattern. Thus, groups are homogenous in terms of sociodemographic variable

Section –II

Frequency and percentage distribution of clinical variables.

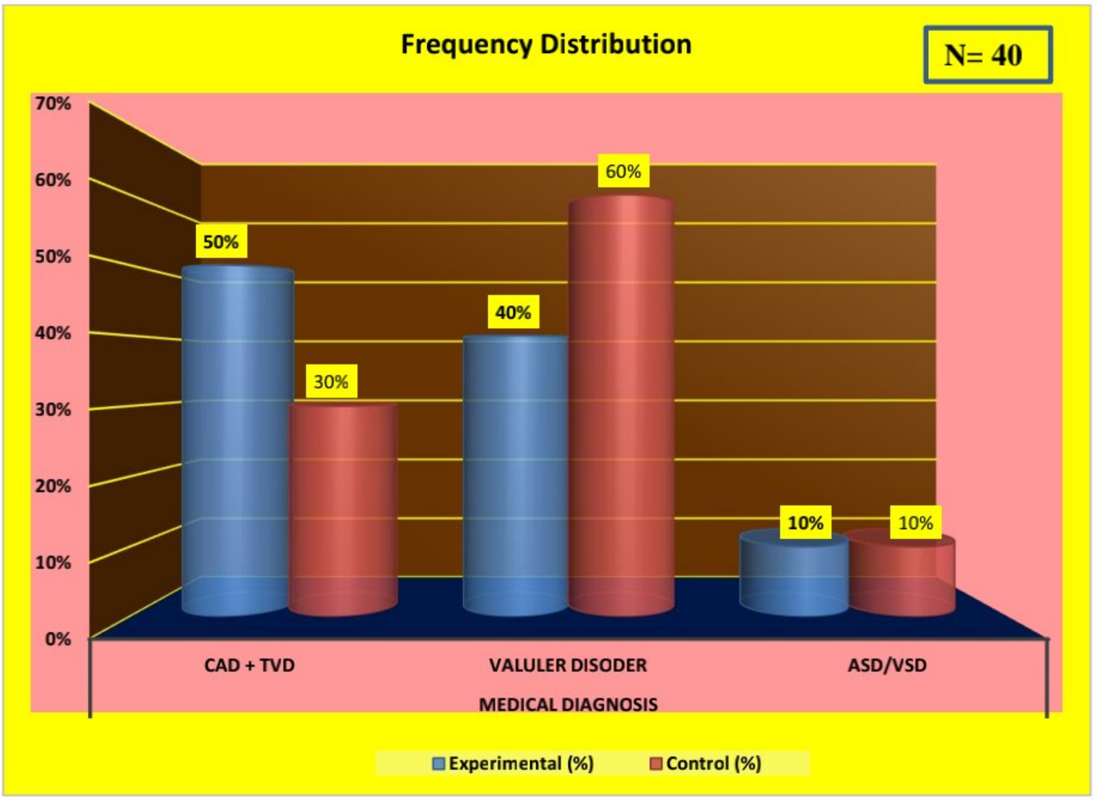

Figure: 12 Distribution of Medical Diagnosis in Experimental and control group

Figure 12 and table 3 shows medical diagnosis in experimental and control group, Most of the study participants diagnosed with Valve disorder (40% in Experimental group and 60% in control group) followed by CAD+TVD (50% in Experimental group and 30% in control group).Least participants diagnosed to ASD/VSD which was 10% in Experimental group and 10% in control group.

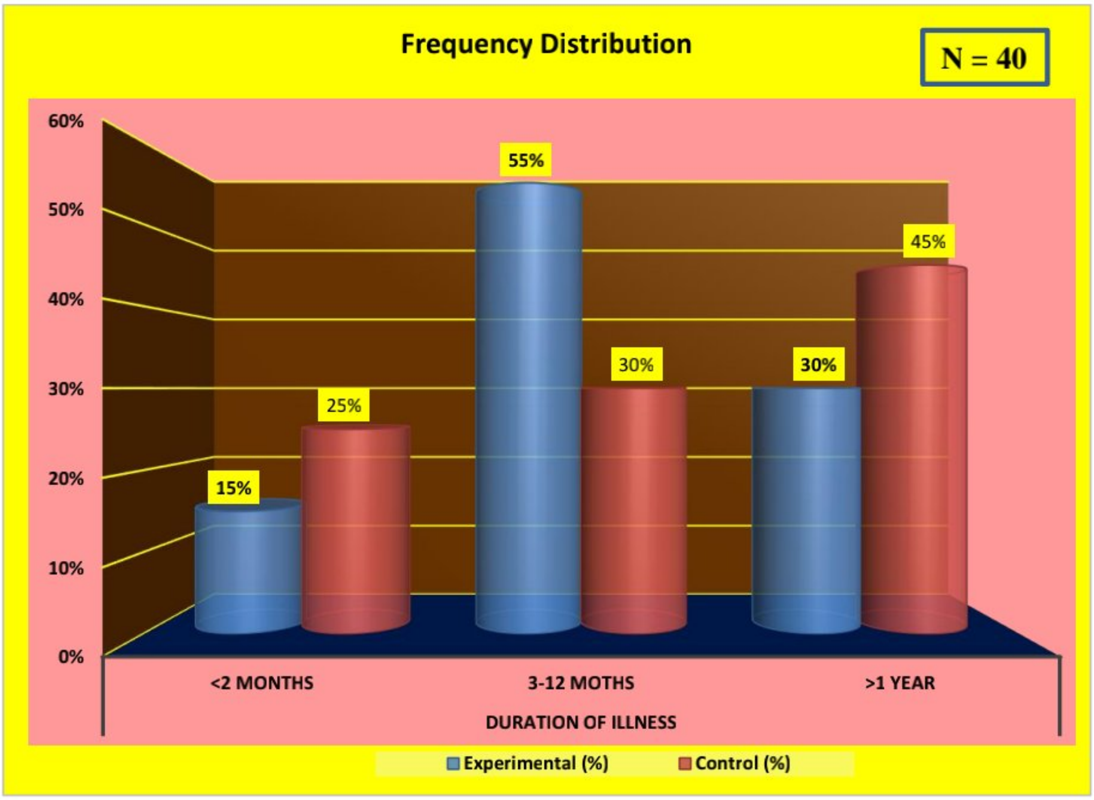

Figure: 13 Frequency Distribution of Duration of illness in Experimental and control

Figure 13 and table 3 showing duration of illness of diagnosed disease Most of the study participants had illness since 3-12 months (55% in Experimental group and 30% in control group) followed by >1 year of illness (30% in Experimental group and 45% in control group) .Least participants had illness <2 months (15% in Experimental and 25% in control group).

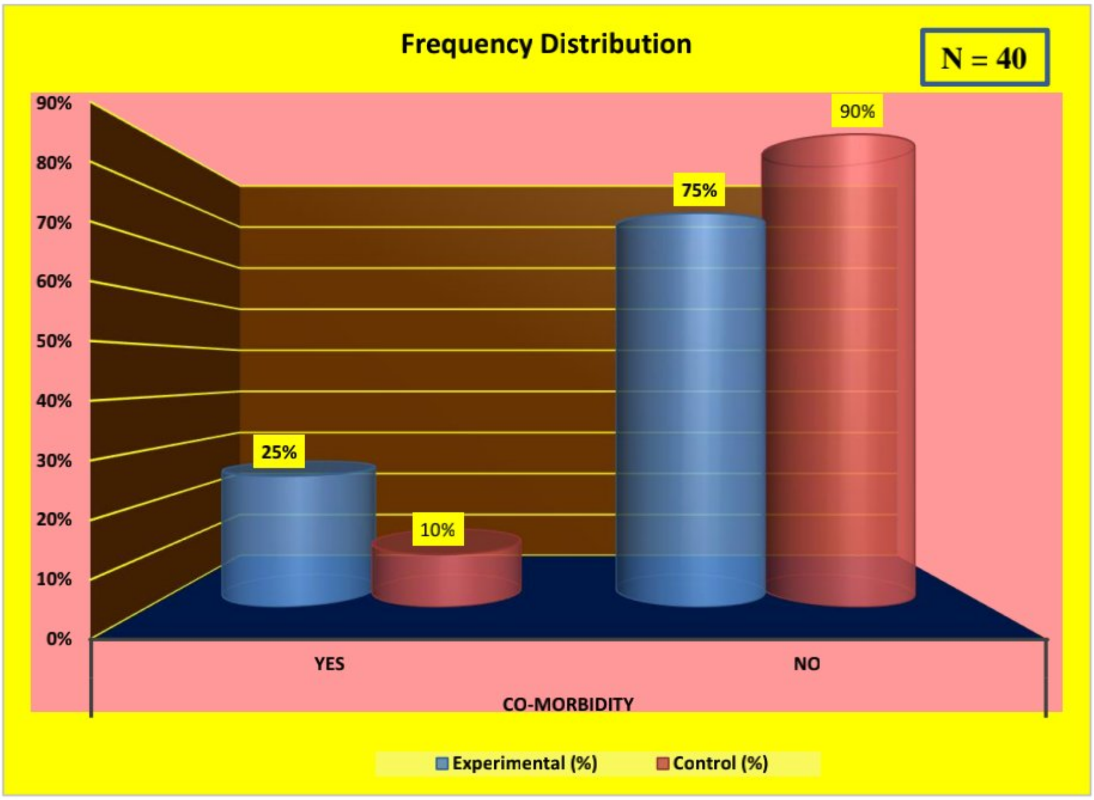

Figure: 14 Distribution of Co-Morbidity in Experimental and control group

Figure 14 and table 3 showing distribution of co-morbidity. Most of the participants having no co-morbidity (75% in Experimental group and 90% in control group) and having co-morbidity (25% in experimental group and 10% in control group).

Table 3

Frequency, percentage and homogeneity testing of clinical variables of experimental and control group

N = 40

Variables	**Experimental (%)**	**Control (%)**	**Experimental (20)**	**Control (20)**	**Chi Test**	**df**	**P Value**
Medical Diagnosis							
CAD + TVD	50.0%	30.0%	10	6	1.800	2	0.407
Valuler disorder	40.0%	60.0%	8	12			
ASD/VSD	10.0%	10.0%	2	2			
Duration of illness							
<2 months	15.0%	25.0%	3	5	2.571	2	0.277
3-12 moths	55.0%	30.0%	11	6			
>1 year	30.0%	45.0%	6	9			
Co-Morbidity							
Yes	25.0%	10.0%	5	2	1.558	1	0.212
No	75.0%	90.0%	15	18			
Name of Surgery							
CABG	50%	30%	10	6	1.800	2	0.407
Valve Repair/Replace	40%	60%	8	12			
ASD/VSD Closure	10%	10%	2	2			
Previous history of Surgery							
Cardiac	10.0%	5.0%	2	1	0.658	2	0.720
Non-Cardiac Surgery	15.0%	10.0%	3	2			
No Surgery	75.0%	85.0%	15	17			
Type of Anesthesia Given							
General Anesthesia	100 %	100%	20	20			N.A

Table 3 showing distribution of clinical variables, Majority of participants in experimental group (50%) diagnosed with CAD + TVD whereas majority of participants control group diagnosed with heart valve disorder.(60%) remaining participants diagnosed with ASD/VSD in both the groups (experimental 10 % and in control 10 %) . Majority of participants in both the groups never undergone to any surgery previously (75 % in Exp. and 85 % in control group) All the participants in the both groups given general anaesthesia before surgery.

P values were found to be > 0.05 , which shows that there is no significant between experimental and control group regarding their diagnosis, duration of illness, co- morbidity , name of surgery, previous history of surgery and type of anaesthesia given before surgery Thus , groups are homogenous and comparable.

Table 4

Mean and standard deviation of clinical variables of experimental and control group

N = 40

GROUPS	**EXP (mean and SD)**	**CONTROL (mean and SD)**
Duration of surgery	5.05+.604	5.30 +0.732
Mean of ICU length stay (in days)	4+1.12	5.60+1.66

Table 4 undertakes mean hours to complete planned surgery and duration of ICU stay in days Mean hours of Duration of surgery in both the group were .Mean value of ICU stay after surgery for experimental group was 4 days whereas for control group 5.60 days.

SECTION III

Comparison of postoperative pulmonary complication between experimental and control group/Effectiveness of the intervention (deep breathing and anulom vilom pranayama)

a) Comparison of primary outcome (PPCs) between experimental and control group

H1: There is significant difference between experimental and control group in terms of post-operative pulmonary complication at 0.05 level of significance.

H01: There will be no significant difference between experimental and control group in terms of post-operative pulmonary complication at 0.05 level of significance

Table 5

Comparison of experimental and control group in terms of postoperative pulmonary complication (primary outcome)

N = 40

PPC		**Groups**		**Test values**				
Variables	Option	Exp.	Control	Fisher's Exact/ Chi Test	P Value	df	Table Value	Result
Atelectasis	No	19	11	8.533*	0.008	1	3.841	S
	Yes	1	9					
Pulmonary Edema	No	14	18	2.500*	0.235	1	3.841	NS
	Yes	6	2					
Pleural Effusion	No	17	17	0.000	1.000	1	3.841	NS
	Yes	3	3					
Pneumonia	No	18	16	0.784*	0.661	1	3.841	NS
	Yes	2	4					

(*: fisher's exact value , df : degree of freedom, S : significant , NS : non significant,Exp. : experimental)

Above table (5) depicts that, patient's developed variety of pulmonary complications in their early postoperative days in experimental and control group. In term of atelectasis total 10 (25% of total) participants developed atelectasis in which 9(90%) belongs to control group and 1 (10%) belongs to experimental group with p value of 0.008 that is < 0.05 suggestive of significant difference between experimental and control group. In terms of pulmonary edema total 8 (20% of total) participants developed pulmonary edema in which 6 (75%) from experimental group and 2 (25%) from control group. In terms of pleural effusion total 6 (15%) participants developed pleural Effusion in which 50% from experimental as well as 50% from control groups. In terms of pneumonia total 6(15%) participants developed pneumonia out of the 4 (66.66%) belongs to control group and 2(33.33%) belongs to control group.

P value of chi square / FET shows the is a significant difference between experimental and control group in terms of atelectasis as post -operative pulmonary complication. (p = 0.008)

Thus, null hypothesis **H01** rejected : there is a significant difference between experimental and control group in terms of atelectasis as a postoperative pulmonary complication.

b) Comparison of means of secondary outcome (length of ICU stay)

Table 6

Comparison of means of secondary outcome (length of ICU stay) between experimental and control group

N = 40

GROUPS	Mean of ICU length stay (in days)	SD	T value	df	P value	Result
EXPERIMENTAL	4	1.12	3.138	38	0.0054	S
CONTROL	5.60	1.66				

(**EXP** : experimental ,**S** : significant ,ICU : Intensive care unit)

Table 6 depicts the means score of length of ICU stay in experimental group is 4 days and in control group 5.60 days with the p value of 0.0054 that significant ($p < 0.05$)

It is suggestive of significant difference is there in experimental and control group regarding postoperative ICU stay.

Significant difference is found in experimental and control group in terms of ICU length stay, participants of experimental group stayed in ICU for fewer days as compare to control group.

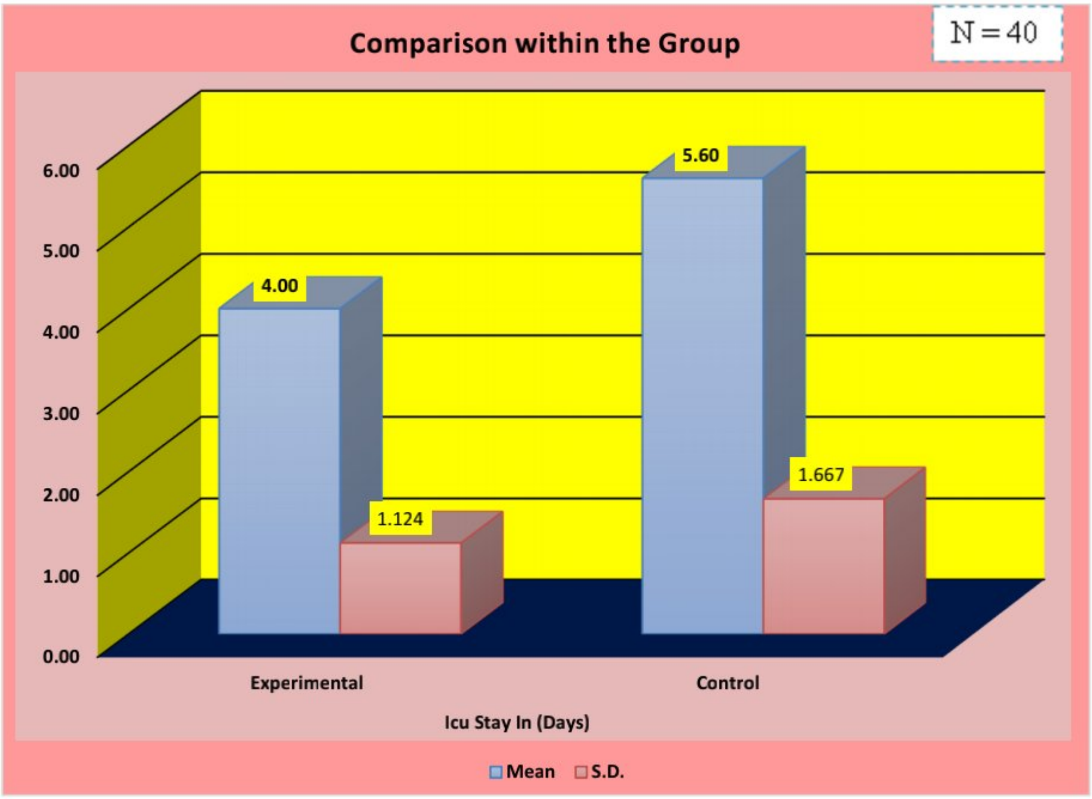

Figure: 15 Distribution of ICU stay (Days) in Experimental and control group

Figure 15 and table 6 depicts Mean and standard deviation of Participant in ICU of Control group are 5.60 days and 1.667 days respectively. On the other side Mean and standard deviation of Participant in ICU of Experimental group are 4.00 days and 1.124 days respectively.

SECTION IV

Association of postoperative pulmonary complication with selected socio-demographic and clinical variables.

Objective – 3 To find out the association between postoperative pulmonary complications with selected sociodemographic and clinical variables among post-operative cardiac patients.

Hypothesis

H02 – There is no significant association between postoperative pulmonary complication with selected sociodemographic and clinical variables.

Section IV of result part arranged in following heading:-

- Association of atelectasis (PPC) with selected sociodemographic and clinical variable
- Association of pulmonary edema (PPC) with selected sociodemographic and clinical variable
- Association of pleural effusion (PPC) with selected sociodemographic and clinical variable
- Association of pneumonia (PPC) with selected sociodemographic and clinical variable

Table 7

Association of Atelectasis with sociodemographic and clinical variable in experimental and control group

N = 40

Demographic and clinical variables	Experimental Group (n = 20)					Control Group (n = 20)				
	Atelectasis		Chi Test	df	P Value	Atelectasis		Chi Test	df	P Value
	No	Yes				No	Yes			
Age										
Up to 30 Years	6	0	1.579	3	0.664	2	1	1.93	3	0.58
30-45 Years	3	0				5	2			
45-60 Years	7	1				3	5			
>60 Years	3	0				1	1			
Gender										
Male	11	1	0.702	1	0.402	5	6	0.90	1	0.34
Female	8	0				6	3			
Other	0	0				0	0			
Exercise Habit										
Yes	3	0	0.186	1	0.666	0	1	1.28	1	0.25
No	16	1				11	8			
Smoking habit										
Yes	5	1	2.456	1	0.117	2	2	0.05	1	0.82
No	14	0				9	7			
BMI										
Underweight	3	0	3.158	2	0.206	2	2	0.05	1	0.82
Normal Weight	12	0				9	7			
Overweight	4	1				0	0			
Obese	0	0				0	0			
Extremely Obese	0	0				0	0			
Co-Morbidity										
Yes	4	1	3.158	1	0.076	1	1	0.02	1	0.88
No	15	0				10	8			
Name of Surgery										
CABG	8	1	1.287	2	0.526	2	3	0.67	2	0.71
Valve Repair/Replace	9	0				7	5			
ASD/VSD Closure	2	0				2	1			

As table 7 shows calculated chi square and p value shows that there is no significant association between selected sociodemographic and clinical variable with atelectasis among both experimental and control group.

Table 8

Association between Atelectasis and clinical variables (Duration of surgery and ICU stay in days)

N = 40

Clinical variables	EXPERIMENTAL (n = 20)					CONTROL (n = 20)			
	Atelectasis	Mean	SD	P value	T value	Mean	SD	P value	T value
Duration of Surgery (in hours)	No	5.05	0.621	0.935	0.083	5.36	0.505	0.679	0.420
	Yes	5.00				5.22	0.972		
ICU Stay in (Days)	No	4.05	1.129	0.376	0.909	5.45	1.508	0.678	0.422
	Yes	3.00				5.78	1.922		

Table 8 Shows mean and SD of duration of surgery in hours and length of ICU stay in days post-surgery in both experimental and control group Calculated P value found (> 0.05) so that there is no significant association between atelectasis and selected socio demographic variables and clinical variables in experimental and control group.

Table 9

Association of Pulmonary edema with sociodemographic and clinical variable

N = 40

Demographic and clinical variables	Experimental Group (n=20)					Control Group (n=20)				
	Pulmonary edema					Pulmonary edema				
	No	Yes	Chi Test	Df	P Value	No	Yes	Chi test	df	P value
Age										
Up to 30 Years	5	1	0.754	3	0.860	3	0	0.333	3	0.343
30-45 Years	2	1				7	0			
45-60 Years	5	3				6	2			
>60 Years	2	1				2	0			
Gender										
Male	9	3	0.357	1	0.550	10	1	0.022	1	0.881
Female	5	3				8	1			
Other	0	0				0	0			
Habit of Exercise and yoga										
Yes	2	1	0.019	1	0.891	1	0	0.117	1	0.732
No	12	5				17	2			
Smoking										
Yes	5	1	0.726	1	0.394	3	1	1.250	1	0.264
No	9	5				15	1			
BMI										
Underweight	3	0	1.587	2	0.452	4	0	0.556	1	0.456
Normal Weight	8	4				14	2			
Overweight	3	2				0	0			
Obese	0	0				0	0			
Extremely Obese	0	0				0	0			
Co-Morbidity										
Yes	2	3	2.857	1	0.091	1	1	3.951	1	0.047
No	12	3				17	1			
Name of Surgery										
CABG	7	2	2.011	2	0.366	5	0	1.481	2	0.477
Valve Repair/Replace	5	4				10	2			
ASD/VSD Closure	2	0				3	0			

Table 9 depicts that calculated chi square and p value suggestive of there is no significant association between selected sociodemographic and clinical variable with pulmonary oedema in both the groups except for co-morbidity and pulmonary edema in control group with p value 0.047 ($p < 0.05$) .

Table 10

Association between Pulmonary edema and clinical variables (Duration of surgery and ICU stay in Days))

N = 40

Clinical variable	EXPERIMENTAL(n = 20)					CONTROL (n = 20)			
	PULMONARY EDEMA	Mean	SD	P value	T value	Mean	SD	P value	T value
Duration of Surgery	No	5.07	0.616	0.816	0.236	5.28	0.752	0.695	0.398
	Yes	5.00	0.632			5.50	0.707		
ICU Stay in (Days)	No	3.71	1.069	0.082	1.843	5.61	1.754	0.932	0.087
	Yes	4.67	1.033			5.50	0.707		

Calculated t value and P value of table 10 shows that there is no significant relationship is there between pulmonary oedema and duration of surgery and length ICU stay in both experimental and control group ($p > 0.05$

Table 11

Association of Pleural effusion with selected sociodemographic and clinical variable

N = 40

Demographic and clinical variables	**Experimental Group (n=20)**					**Control Group (n=20)**				
	Pleural effusion					**Pleural effusion**				
	No	Yes	Chi Test	df	P Value	No	Yes	Chi test	df	P value
Age										
Up to 30 Years	6	0	2.680	3	0.444	3	0	2.493	3	0.477
30-45 Years	2	1				6	1			
45-60 Years	7	1				7	1			
>60 Years	2	1				1	1			
Gender										
Male	9	3	2.353	1	0.125	8	3	2.888	1	0.089
Female	8	0				9	0			
Exercise Habit										
Yes	3	0	0.623	1	0.430	1	0	0.186	1	0.666
No	14	3				16	3			
Smoking										
Yes	5	1	0.019	1	0.891	3	1	0.392	1	0.531
No	12	2				14	2			
BMI										
Underweight	3	0	0.654	2	0.721	4	0	0.882	1	0.348
Normal Weight	10	2				13	3			
Overweight	4	1				0	0			
Obese	0	0				0	0			
Exte. Obese	0	0				0	0			
Co-Morbidity										
Yes	4	1	0.131	1	0.718	2	0	0.392	1	0.531
No	13	2				15	3			
Name of Surgery										
CABG	8	1	0.828	2	0.661	4	1	0.654	2	0.721
Valve Repair/Replace	7	2				10	2			
ASD/VSD closure	2	0				3	0			

As table 11 shows calculated chi square and p value shows that there is no significant association between selected sociodemographic and clinical variable with pleural effusion among both experimental and control group.

Table 12

Association of Pleural Effusion with clinical variables (Duration of surgery and ICU stay in (Days))

N = 40

Clinical Variables	EXPERIMENTAL (n = 20)					CONTROL (n = 20)			
	Pleural Effusion	Mean	SD	P value	T value	Mean	SD	P value	T value
Duration of Surgery	No	5.06	0.659	0.881	0.151	5.24	0.752	0.361	0.937
	Yes	5.00	0.000			5.67	0.577		
ICU Stay in (Days)	No	3.94	1.144	0.591	0.547	5.71	1.687	0.514	0.666
	Yes	4.33	1.155			5.00	1.732		

The p value of table 12 suggestive of there is no significant association found between pleural effusion and selected socio demographic and clinical variables in both experimental and control group .($p > 0.05$)

Table 13

Association of Pneumonia with sociodemographic and clinical variable

N = 40

Demographic and clinical variables	**Experimental Group (n=20)**					**Control Group (n=20)**				
	Pneumonia		Chi Test	df	P Value	**Pneumonia**		Chi test	D f	P value
	No	Yes				No	Yes			
Age										
Up to 30 Yrs	6	0	2.870	3	0.412	2	1	1.882	3	0.597
30-45 Years	3	0				6	1			
45-60 Years	7	1				7	1			
>60 Years	2	1				1	1			
Gender										
Male	10	2	1.481	1	0.224	9	2	0.051	1	0.822
Female	8	0				7	2			
Other	0	0				0	0			
Exercise Habit										
Yes	3	0	0.392	1	0.531	1	0	0.263	1	0.608
No	15	2				15	4			
Habit of Smoking										
Yes	5	1	0.423	1	0.515	2	2	2.813	1	0.094
No	13	1				14	2			
BMI										
Underweight	3	0	0.926	2	0.629	2	2	2.813	1	0.094
Normal Weight	11	1				14	2			
Overweight	4	1				0	0			
Obese	0	0				0	0			
Extremely Obese	0	0				0	0			
Co-Morbidity										
Yes	4	1	0.741	1	0.389	1	1	1.250	1	0.264
No	14	1				15	8			
Name of Surgery										
CABG	7	2	2.716	2	0.257	4	1	0.417	2	0.812
Valve Repair	9	0				10	2			
ASD/VSD Closure	2	0				2	1			

Table 13 depicts that calculated chi square and p value suggestive of there is no significant association between selected sociodemographic and clinical variable with pneumonia in both experimental and control group.

Table 14

Association between Pneumonia and clinical variables (Duration of surgery and ICU stay in (Days))

N = 40

Clinical variables	EXPERIMENTAL (n=20)					CONTROL (n=20)			
	Pneumonia	Mean	SD	P value	T value	Mean	SD	P value	T value
Duration of Surgery	No	5.00	5.94	0.279	1.116	5.13	0.619	0.028	2.385
	Yes	5.50	0.707			6.00	0.816		
ICU Stay in (Days)	No	3.83	1.043	0.043	2.176	5.13	1.258	0.007	3.058
	Yes	5.50	0.707			7.50	1.915		

The table 14 depicts the association of pneumonia with duration of surgery and length of ICU stay it describe a significant association between pneumonia and duration of surgery in control with p value 0.028 ($p < 0.05$) and significant association between pneumonia (PPC) and ICU length stay in both experimental (p=0.043) and control group (p=0.007) that is ($p < 0.05$).

Summary: This chapter dealt with result of study in which total (10)25 % participants developed atelectasis out of them only (1) 10 % from experimental group and 90 % (9) belongs to control group that makes a significant difference with p value of 0.008. There was a significant relationship between certain postoperative pulmonary complication and certain selected sociodemographic and clinical variable in experimental and control group.

CHAPTER V

DISCUSSION

CHAPTER V

DISCUSSION

This chapter deals with major findings of the study, discussion, limitation of the study, implication for the study, conclusion and recommendations.

Major findings of the study

- Majority of participants in both experimental and control group (40% and 40 %) belongs to the age category 45-60 year.
- Majority of participants in both experimental and control group was male (60% and 55 %).
- Majority of participants in both experimental and control group had primary level of education (both 50%).
- Majority of participants in both the exp. and control (85% & 95%) not having a habits of yoga and exercise.
- Majority of participants in both experimental and control group (70% and 80 %) are Non Smoker.
- Majority of participants in both experimental and control group belongs to normal BMI range (60% and 80 %).
- Majority of participants in both experimental and control group are vegetarian (60% and 80 %)
- Majority of participants in experimental group (50%) diagnosed with CAD + TVD whereas majority of participants control group diagnosed with heart valve disorder. (60%).
- Majority of participants in experimental group had duration of illness 3-12 months (55%) whereas in control group majority of participants (45%) had duration of illness > 1 year of time.

- Majority of participants in both experimental and control group (75% and 90 %) are not had any co morbidity like diabetes and hypertension.
- Majority of participants in experimental group (50%) undergone CABG surgery whereas majority of participants control group undergone valve repair and replacement surgery. (60%).
- Majority of participants in both the groups not had any history of previous surgery (75 % in Exp. and 85 % in control group)
- Mean hours of Duration of surgery in both the group were
- Mean value of length of ICU stay after surgery for experimental group was 4 days whereas 5.60 days for control group.

Findings related to intervention

- In term of atelectasis total 10 (25% of total participants) developed atelectasis in which 9 (90%) belongs to control group and 1 (10%)belongs to experimental group
- There is a significant difference is found in the postoperative pulmonary complication in terms of atelectasis between experimental and control group with p value of 0.008 that is ($p< 0.05$)
- The means score of length of ICU stay in experimental group is 4 and in control group 5.60 with the p value of 0.0054 that statistically significant ($p < 0.05$) participants of experimental group stayed in CTVS ICU for less days as compare to control group
- There is significant association is found in PPC in terms of pulmonary oedema and clinical variable co morbidity in control group with p value of 0.047 (< 0.05)

- There is significant association is found in PPC in terms of pneumonia and clinical variables duration of surgery in control group with p value 0.028 that is ($p < 0.05$).
- There is significant association is found in PPC in terms of pneumonia and length of ICU stay in experimental with p value of 0.043 and in control group with p value of 0.007 ($p < 0.05$).

Discussion

The present study was intended to see the effect of deep breathing anulom vilom pranayama on postoperative pulmonary complication associated with cardiac surgeries.

1. Effect of deep breathing and anulom vilom on postoperative pulmonary complication

In the present study there was a significant decrease in the incidence of atelectasis in experimental Group that is showed the total incidence of postoperative atelectasis occurred in 10 study participants out of them 1 (2.5 %) belongs to experimental group and 9 (22.5 %) belongs to control group control group(*(p = 0.08)*

Therefore, the null hypothesis is rejected in term of atelectasis.

- Elisabeth westerdhal. et.al. conducted [23]prospective randomised control trial in which 48 participants in experimental group performing deep breathing exercises and 42in control group who are no performing any exercises postoperatively ,in which they found that Deep-breathing exercises can reduce atelectasis and improve pulmonary function after coronary artery bypass surgery, with 72% of patients experiencing a subjective benefit. Birgitta lindmark[24]t.al Deep breathing exercises after cardiac surgery significantly decrease atelectasis and area affected to atelectasis increase aerated lung area, and slightly increase PaO2, with no significant difference between breathing techniques.

Same result were confirmed by Yanez brage at al. [26]their observational study which was conducted 263 patients revealed that preoperative deep breathing exercise and assisted coughing after CABG related to lower incidence of atelectasis. Henderson, Y. reported [25]eep breathing induced by carbon dioxide inhalation effectively prevents atelectasis and postoperative pneumonia, reducing the risk of postoperative complications.

A meta-analysis conducted by Smith et al. [28] aggregated findings from several RCTs, revealing a trend toward reduced incidence of atelectasis and pneumonia in patients practicing deep breathing exercises postoperatively.

Our findings are consistent with previous studies

2. Effect of deep breathing and anulom vilom on post-operative icu length stay

Deep breathing techniques and anulom vilom (alternate nostril breathing) have been shown to reduce the length of stay in intensive care units (ICUs) after surgery. Current study shows Mean value of days stayed in ICU postoperatively experimental group for experimental group participants were 4 days with the standard deviation of 1.12 and for control group participants were 5.60 days with the standard deviation of 1.66.

By comparing both the groups with unpaired t test the p value found 0.0054 that is ($p<0.05$) suggestive of is significant difference between experimental group and control group in terms of ICU stay after surgery. Existing research on their effectiveness suggests that incorporating these techniques into ICU protocols could lead to shorter stays, improved patient outcomes, and reduced complications.

Azeez AM, Puri GD et al. [27] A prospective randomised controlled study in which participants undergone cardiac surgery supporting the similar result that The yoga group (including anulom vilom pranayama intervention) experienced a significant decrease in the average length of their ICU stay (32.60 ± 14.31 versus 67.6 ± 37.39 h, $P = 0.004$) as compared to the control group.

Elisabeth westerdhal. et.al.,[23]a prospective randomised control trial in which 48 participants in experimental group performing deep breathing exercises and 42in control group who are no performing any exercises postoperatively , contradictory to this result ,in which they found that length of ICU or hospital stay did not make any difference

3. **Association between selected sociodemographic variable and post-operative pulmonary complication.**

From Table 7,9,11,13 there is no any association was found between PPCs and sociodemographic variables.

4. **Association between selected clinical variables and post-operative pulmonary complication.**

The table 14 shows that there is a significant difference between pneumonia and duration of surgery in control with p value 0.028 ($p < 0.05$).

Supporting study for this Denu ZA,[2015] [29]in which Duration of surgery were found to be significantly associated with postoperative pulmonary complications

Consequently, the most frequent postoperative pulmonary complication in study was postoperative pneumonia (85.2) in Denu ZA et.al. [2015] study**.** Similarly, extended surgery was found to be a strong predictor of PPCs, and a review of the literature supports this finding [30 , 31] In fact, multivariate studies have shown that three to four hours of surgery is a reliable indicator of the likelihood of postoperative pulmonary problems.

Table 9 shows that there is a significant association is there between pulmonary oedema and co morbidity (clinical variable) in control group with p value 0.047 ($p < 0.05$) . There are no supporting studies for this association .

There is significant difference is there between pneumonia (PPC) and ICU length stay in both the groups experimental (p=0.043) and control p=(0.007) that is ($p < 0.05$)

There are no supporting studies found for this association where a significant association is found between general anesthesia and PPCs.[29]

Strengths of study

- Strong study design – randomized control trial which lies top of evidence hierarchy was adopted for the study.
- Use of allocation concealment mechanism in randomization reduced selection bias from the part of researcher
- Intervention was provided by researcher alone which ensure equality in administration of intervention.

Limitations of the study

- Only one setting (CTVS Dept. AIIMS Bhopal) could be taken due to time and resource unavailability.
- Less no. of surgeries scheduled due to 4 working days of O.T. in a week for different cardiac, pulmonary and peripheral vascular surgeries.
- Sample loss due to Surgeries postponed after PAC if patients found altered level of some parameter like blood sugar level, TSH, and other electrolytes**.**

Implication of the study

Nursing Practice

- ✓ Nurses play a crucial role in educating patients about deep breathing exercises and Anulom Vilom Pranayama preoperatively.
- ✓ Training patients on these techniques could become a standard part of preoperative nursing care to enhance their respiratory preparedness.
- ✓ The study may highlight the importance of holistic nursing care, prompting nurses to consider not only traditional medical interventions but also complementary approaches to enhance patient recovery.

Research

- ✓ Positive outcomes are observed, nurses should be proficient in documenting the incorporation of these techniques into patient care plans.

Conclusion

The present study assessed the effectiveness of deep breathing and anulom vilom pranayama on postoperative pulmonary pulmonary complication among patients undergoing cardiac surgeries AIIMS Bhopal. The study findings revealed that, regular practice of deep breathing and anulom vilom pranayama before and after cardiac surgeries related to prevention and lower the incidence of atelectasis, hospital (ICU) length stay, a difference can be considered both significant and clinically relevant

Recommendation

1. Recommendation The sample size and study duration can be increased for more reliable results.
2. Further studies can be done using different variables like length of hospital stay, respiratory function parameters, and patient-reported outcomes as secondary outcome.
3. Similar study can be conducted in different setting with large inflow of patients
4. Long-Term Follow-up studies can be conducted: Extend the follow-up period to assess the long-term effects of these interventions on respiratory function and quality of life. This would provide valuable information on the sustainability of benefits beyond the immediate postoperative period.
5. Comparisons studies with Other Mind-Body Interventions can be done.

Summary: This chapter stated major findings and discussed them in light of the available literature. Limitation, implications, recommendations and conclusion were stated.

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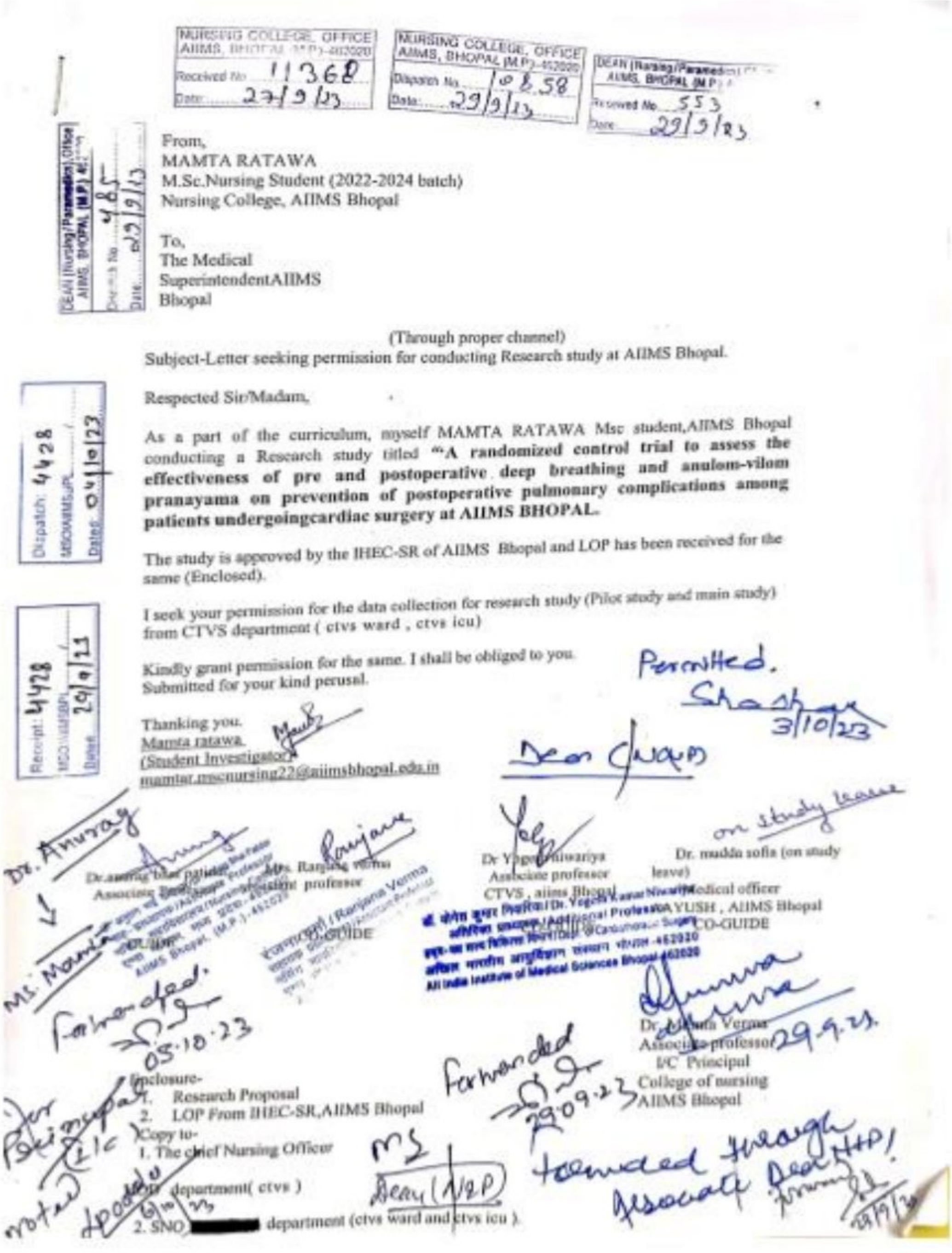
ANNEXURES

ANNEXURE 1
LETTER SEEKING PERMISSION FOR COUNDUNTING STUDY



NURSING COLLEGE, OFFICE
AIIMS, BHOPAL (M.P.)-462020
Received No. 11368
Date 27/9/23

NURSING COLLEGE, OFFICE
AIIMS, BHOPAL (M.P.)-462020
Dispatch No. 10858
Date 29/9/23

DEAN (Nursing/Paramedical)
AIIMS, BHOPAL (M.P.)
Received No. 553
Date 29/9/23

DEAN (Nursing/Paramedical) Office
AIIMS, BHOPAL (M.P.)
Dispatch No. 485
Date 29/9/23

From,
MAMTA RATAWA
M.Sc.Nursing Student (2022-2024 batch)
Nursing College, AIIMS Bhopal

To,
The Medical
SuperintendentAIIMS
Bhopal

(Through proper channel)

Subject-Letter seeking permission for conducting Research study at AIIMS Bhopal.

Dispatch: 4428
MS/OAIIMS/...
Dated: 04/10/23

Respected Sir/Madam,

As a part of the curriculum, myself MAMTA RATAWA Msc student,AIIMS Bhopal conducting a Research study titled **"A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom-vilom pranayama on prevention of postoperative pulmonary complications among patients undergoingcardiac surgery at AIIMS BHOPAL.**

The study is approved by the IHEC-SR of AIIMS Bhopal and LOP has been received for the same (Enclosed).

I seek your permission for the data collection for research study (Pilot study and main study) from CTVS department (ctvs ward , ctvs icu)

Receipt: 4428
MS/...
Dated 29/9/23

Kindly grant permission for the same. I shall be obliged to you.
Submitted for your kind perusal.

Permitted.
Shashank
3/10/23

Thanking you.
Mamta ratawa
(Student Investigator)
mamtar.mscnursing22@aiimsbhopal.edu.in

Dean (N&P)

Dr. Anurag

Dr. anurag bhai patidar
Associate Professor

Mrs. Ranjana verma
Assistant professor
CO-GUIDE

Dr Yogesh Niwariya
Associate professor
CTVS , aiims Bhopal

on study leave

Dr. mudda sofia (on study leave)
Medical officer
AYUSH , AIIMS Bhopal
CO-GUIDE

डॉ. योगेश कुमार निवारिया / Dr. Yogesh Kumar Niwariya
अतिरिक्त प्राध्यापक / Additional Professor
All India Institute of Medical Sciences Bhopal-462020

Ms. Mamta

Forwarded.
05.10.23

Dr. Mamta Verma
Associate professor 29.9.23
I/C Principal
College of nursing
AIIMS Bhopal

forwarded
29.09.23

Enclosure-
1. Research Proposal
2. LOP From IHEC-SR,AIIMS Bhopal

Copy to-
1. The chief Nursing Officer
HOD department(ctvs)
2. SNO [redacted] department (ctvs ward and ctvs icu).

for Principal (I/C)
noted
Apoddu
6/10/23

MS
Dean (N&P)

forwarded through Associate Dean HP!
29/9/23

ANNEXURE 2

SCREENING TOOL

1. DATE OF ASSESSMENT ………………………………………………………………
2. AGE (in years) ………………………………………………………
3. Diagnosis ……………………………………………………………
4. Are you able to understand Hindi or English? [Yes/No]

   ………………………………………

5. Is patient planned for cardiac Surgery?

   ………

6. Is the patient diagnosed with any cognitive and neurologic problem? (Yes/No)

   …………………………………………………………………………..

7. Is patient with NG tube placement OR recent nostril injury and nostril surgery?

   …………………………………………………………………………..

8. Are you willing to participate in the study?

   [ ] YES [ ] NO

SELECTED FOR THE STUDY ➡ [ ] YES [ ] NO

1. PATIENT NAME ……………………………………………………………..
2. CODE NO. ………………………………………………………………………
3. PLACE OF SCREENING ………………………………………………………..
4. CONTACT NUMBER ……………………………………………………………...
5. ADDRESS ……………………………………………………………………………

ANNEXURE 3

TOOL OF THE STUDY

SECTION A – SOCIODEMOGRAPHIC PROFILE (ENGLISH)

The Following Question Relates To Social Population Information, You Are Requested To Provide Some Information About Yourself, This Information Will Be Kept Confidential.

Code No: ________________________________
Date And Time Of Admission: ________________________________

Date And Time Of Surgery: ________________________________

1.	Age (In Years)	---------------
2.	Gender	1) Male 2) Female 3) Other
3.	Educational Status	1)No formal Education 2)Primary 3)Secondary 4)High Secondary 5)Graduate And Above
4.	Occupation	1)Home Maker 2)Laborer 3)Professional 4)Any Other(Specify-------------)
5.	Religion	1)Hindu 2)Muslim 3)Christian 4)Others
6.	Habit Of Yoga And Exercises	1) Yes 2) No
7.	Residential Area	1)Urban 2)Rural 3)Slum
8.	Type Of Family	1)Nuclear Family 2)Extended Family 3)Joint Family

9.	Monthly Income Of Family (Acc.To Kuppuswami Scale)	1)<9226 2) 9232- 27648 3) 27654-46089 4) 46095-68961 5) 68967-92185 6) 92191-184370 7) > 184376
10.	Do You Have History Of Smoking	1)Yes _____ (For How Many Years /Months) 2) No
11.	BMI	1) Underweight(<18.5) 2) Normal Weight (18.5 -24.9) 3) Overweight (25-29.5) 4) Obese (30 -34.9) 5)Extremely Obese (>35)
12.	Dietary pattern	1). Vegetarian 2) Non – Vegetarian 3) any other (specify_______)

SECTION-B CLINICAL PROFILE

The Following Question Relates To Clinical Information, You Are Requested To Provide Some Information About Yourself As You Know Further This Information Will Be Filled By Medical Records. This Information Will Be Kept Confidential.

Date And Time Of Admission: ________________________________

Date And Time Of Surgery: ________________________________

	PREOPERATIVE DATA COLLECTION	
1.	Medical Diagnosis	--
2.	Duration Of Illness (in days)	--
3.	Co-Morbidity	(DM , HTN, any other) If Yes , then (specify and specify the Duration) --
4.	Name Of Surgery	--
5.	History of Any Previous Surgery	1) Cardiac surgery /cardiac procedure -- 2) Non cardiac surgery -- 3) No surgical history
	POSTOPERATIVE DATA COLLECTION	
6.	Type Of Anesthesia Given	---
7.	Duration Of Surgery (In Hrs.)	---
8.	Length Of ICU Stay Post Surgery.	--

SECTION: C – OBSERVATION-CHECKLIST (POST X-RAY EVALUATION)

This Section Will Filled after Completion of Intervention and Evaluation of X-Ray by Expert CTVS surgeon. The Field It Will Provide Information About Presence Or Absence And Type Of Post-Operative Pulmonary Complication.

S.NO.	**PARAMETERS**	Present	Not
1	Atelectasis		
2	Pulmonary Edema		
3	Pleural Effusion		
4	Pneumonia		

ANNEXURE 4

TOOL OF THE STUDY –HINDI

उपकरण

अनुभाग ए - सामाजिक जनसांख्यिकीय प्रोफ़ाइल

निम्नलिखित प्रश्न सामाजिक जनसंख्या की जानकारी से संबंधित है, आपसे अनुरोध है कि आप अपने बारे में कुछ जानकारी प्रदान करें, यह जानकारी गोपनीय रखी जाएगी।.

कोड संख्या: ______________________

प्रवेश की तिथि और समय:____________________

सर्जरी की तारीख और समय:__________________

1.	आयु (वर्षों में)	---------------
2.	लिंग	1) पुरुष 2) महिला
3.	शैक्षणिक योग्यता	1) कोई औपचारिक शिक्षा नहीं 2) प्राथमिक 3) माध्यमिक 4) उच्च माध्यमिक 5) स्नातक और उससे ऊपर
4.	व्यवसाय	1) होम मेकर 2) श्रम 3) पेशेवर 4) कोई अन्य (निर्दिष्ट-------------)
5.	धर्म	1) हिंदू 2) मुस्लिम 3) ईसाई 4) अन्य
6.	योग और व्यायाम की आदत	1) हाँ 2) नहीं
7.	आवसीय क्षेत्र	1) शहरी 2) ग्रामीण

		3) 3) मलिन बस्ती
8.	परिवार का प्रकार	1)एकल परिवार 2)विस्तारित परिवार 3)संयुक्त परिवार
9.	परिवार की मासिक आय (कुप्पुस्वामी पैमाने के अनुसार)	1)<9226 2)9232- 27648 3) 27654-46089 4) 46095-68961 5) 68967-92185
10.	धूम्रपान की आदत	1) हाँ ________________(तब से) 2) नहीं
11.	बीएमआई वज़न - ऊंचाई - बीएमआई	1) कम वजन(<18.5) 2) सामान्य वजन (18.5 -24.9) 3) अधिक वजन होना (25-29.5) 4) मोटापा (30 -34.9) 5)अत्यधिक मोटा होना (>35)
12.	आहार	1)शाकाहारी 2) मांसाहारी

उपकरण

अनुभाग ब- क्लिनिकल प्रोफ़ाइल

निम्नलिखित प्रश्न सामाजिक जनसंख्या की जानकारी से संबंधित है, आपसे अनुरोध है कि

आप अपने बारे में कुछ जानकारी प्रदान करें, यह जानकारी गोपनीय रखी जाएगी|.

कोड संख्या: ______________________________

प्रवेश की तिथि और समय: ______________________

सर्जरी की तारीख और समय: _____________________

प्रीऑपरेटिव डेटा संग्रह		
1.	चिकित्सा निदान	--
2.	बीमारी की अवधि (दिनों में)	--
3.	सह रुग्णता	1)मधुमेह 2) उच्च रक्तचाप ,यदि हाँ , (अवधि) 3) नहीं --
4.	सर्जरी का नाम	--
5.	कोई पिछली सर्जरी	--
पोस्टऑपरेटिव डेटा संग्रह		
6.	दिए गए एनेस्थीसिया का प्रकार	--
7.	सर्जरी की अवधि (घंटे में)	--
8.	सर्जरी के बाद आईसीयू में रहने की अवधि (दिनों में)	--

अनुभाग: सी - अवलोकन चेकलिस्ट (पोस्ट एक्स-रे मूल्यांकन)

यह खंड क्षेत्र में विशेषज्ञों द्वारा एक्स-रे के हस्तक्षेप और मूल्यांकन के पूरा होने के बाद भरा जाएगा यह उपस्थिति या अनुपस्थिति और पोस्ट-ऑपरेटिव फुफ्फुसीय जटिलता के प्रकार के बारे में जानकारी प्रदान करेगा।

S.NO.	PARAMETERS	उपस्थित	अनुपस्थित
1	श्वासरोध		
2	फुफ्फुसीय शोथ		
3	फुफ्फुस बहाव		
4	न्यूमोनिया		

ANNEXURE 5

LIST OF EXPERTS IN CONTENT VALIDAION

S.N.	Name of the expert	Designation	Institution
1	Dr. Jisa George T	Assistant Professor	CON , AIIMS Bhopal
2	Mr. R Velmurugan	Assistant Professor	CON , AIIMS Bhopal
3	Dr. Kishan Magatapalli	Associate Professor	Dept. of CTVS , AIIMS Bhopal
4	Dr. Surendra	Associate Professor	Dept. of CTVS , AIIMS Bhopal
5	Dr. Kisley Shrivastav	Associate Professor	Dept. of cardiology, AIIMS Bhopal
6	Mrs. Bincy Kuriakosa	Assistant Professor	Kasturba college of nursing , Bhopal
7	Mrs. Nimarta Rana	Assistant Professor	CON , AIIMS JODHPUR
8	Mr. Nipin Kalal	Assistant Professor	CON , AIIMS JODHPUR
9	Dr. Danish Javed	SMO	AYUSH , AIIM BHOPAL
10	Mrs. Sonia	Tutor	CON, AIIMS JODHPUR

ANNEXURE 6

Draft Letter Request Expert's Opinion and Suggestions for the Content Validity of Research tool and Intervention

From, **Date:**
Mamta ratawa
M. Sc. Nursing, 1st year
MSN (Cardiovascular and Thoracic Nursing,)
Nursing College, AIIMS Bhopal

To,
……………………………………

Subject: Requesting the expert's opinion and suggestions for the content validity of research intervention

Respected Sir / Ma'am,

I, mamta ratawa , pursuing my M. Sc. Nursing in Medical Surgical Nursing from Nursing College, AIIMS Bhopal, have selected the below mentioned topic for the dissertation, required for the partial fulfilment of my M. Sc. Nursing programme.

Topic: 'A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom-vilom pranayama on prevention of postoperative pulmonary complications among patients undergoing cardiac surgery at AIIMS BHOPAL.

In this regard, I have prepared a Self-structured Proforma (to collect demographic and clinical details of study sample). I hereby request you to kindly go through this proforma and give your opinion on its content validity, or suggest modification in the content, if required. I shall be grateful for your valuable remarks.

Yours Sincerely,
Mamta ratawa

Name of student	**GUIDE**	**Co-Guides:**	**Co-Guides:**
Mamta ratawa MSc. Nursing (2022-2024 batch) MSN (Cardiovascular and Thoracic Nursing,) CON ,AIIMS, Bhopal	**Dr. Anurag Bhai patidar** Associate Professor Medical Surgical Nursing Department, CON, AIIMS, Bhopal	**Dr. Yogesh kumar niwariya** HOD, dept. of cardiothoracic surgery AIIMS, Bhopal	**Mrs. Ranjana verma** Assistant professor Medical surgical nursing Con, AIIMS Bhopal

Dr. Mamta Verma

I/C Principal
Nursing College,
AIIMS Bhopal

ANNEXURE 7

Criteria Checklist for the Validation of the Tool

The study plans to utilize a self-structured tool consisting of questionnaire to collect socio-demographic data and clinical data of the research study participants.

Self-Structured Proforma consist of three parts:

- **Part A:** It consist of questions to collect the **Socio-demographic data** of the participants.
  This consist of 12 questions
- **Part B:** It consist of questions to collect the **Clinical data** of the participants.
  This consist of 8 questions
- **Part C:** it consist of checklist to determine pulmonary complication.it consist of 5 observation.

Kindly provide your expertise judgement on the degree of relevancy of each item in the questionnaire.
If there are any suggestions or modifications, please mention it in the 'Remarks' column.

CRITERIA CHECKLIST FOR THE VALIDATION OF THE TOOL

SECTION A - SOCIODEMOGRAPHIC PROFILE

- It consists of 12 item.
- 12 items under Socio- demographic data of the patient who scheduled for surgery.
- We need your expertise judgement on degree of relevancy of each item to the measure domain. If there is any suggestions and modifications please mention in the remark column.
- Your expert opinion and kind cooperation will be highly appreciated.

Item number	Highly relevant 4	Quite relevant 3	Somewhat relevant 2	Not relevant 1	Remarks
1.					
2.					
3.					
4.					
5.					
6.					

7.					
8.					
9.					
10.					
11					
12.					

SECTION B : CLINICAL PROFILE

Item number	Highly relevant 4	Quite relevant 3	Somewhat relevant 2	Not relevant 1	Remarks
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					

SECTION C : OBSEVATION CHECKLIST

Item number	Highly relevant 4	Quite relevant 3	Somewhat relevant 2	Not relevant 1	Remarks
1.					
2.					
3.					
4.					
5.					

ANNEXURE 8

Certificate of Tool Validation

This is to certify that the 'Self-Structured Performa' constructed by **MAMTA RATAWA** M. Sc. Nursing (2022 – 2024 batch) student at Nursing College, AIIMS Bhopal, can be utilized in the study titled. **A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom-vilom pranayama on prevention of postoperative pulmonary complications among patients undergoing cardiac surgery at AIIMS BHOPAL.** The tool has been validated by me and is found to be valid/ not valid.

Overall remark:

Signature:

Name of the expert:

Designation:

Name of the institution:

Official seal:

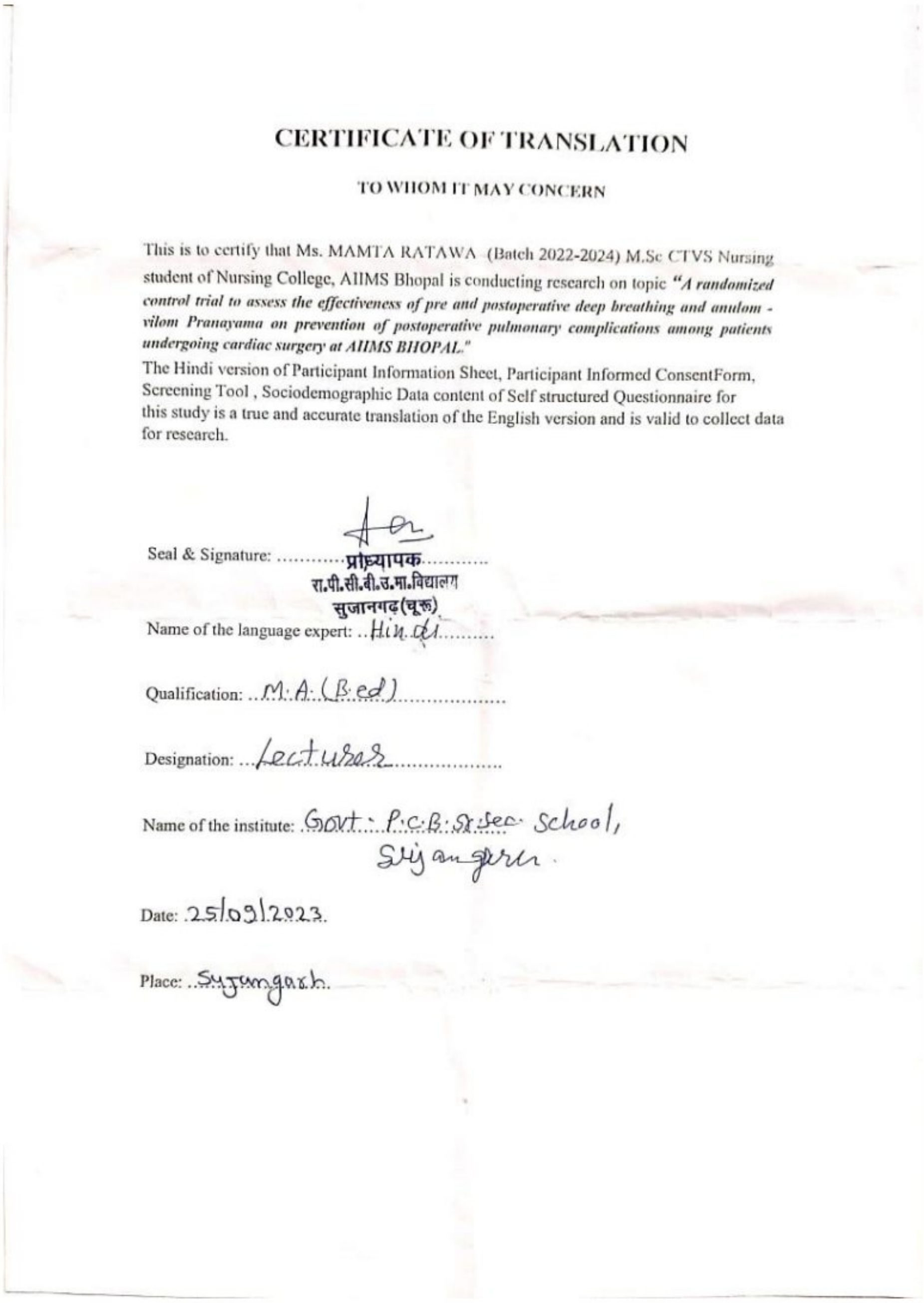
Date:

Place:

ANNEXURE 9

CERTIFICATES OF LANGUAGE TRANSLATION

English – Hindi



CERTIFICATE OF TRANSLATION

TO WHOM IT MAY CONCERN

This is to certify that Ms. MAMTA RATAWA (Batch 2022-2024) M.Sc CTVS Nursing student of Nursing College, AIIMS Bhopal is conducting research on topic ***"A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom - vilom Pranayama on prevention of postoperative pulmonary complications among patients undergoing cardiac surgery at AIIMS BHOPAL."***

The Hindi version of Participant Information Sheet, Participant Informed ConsentForm, Screening Tool , Sociodemographic Data content of Self structured Questionnaire for this study is a true and accurate translation of the English version and is valid to collect data for research.

Seal & Signature: ....प्राध्यापक...........
रा.पी.सी.बी.उ.मा.विद्यालय
सुजानगढ़(चूरू)

Name of the language expert: ..Hin.di.........

Qualification: ..M.A.(B.ed)...................

Designation: ...Lecturer...................

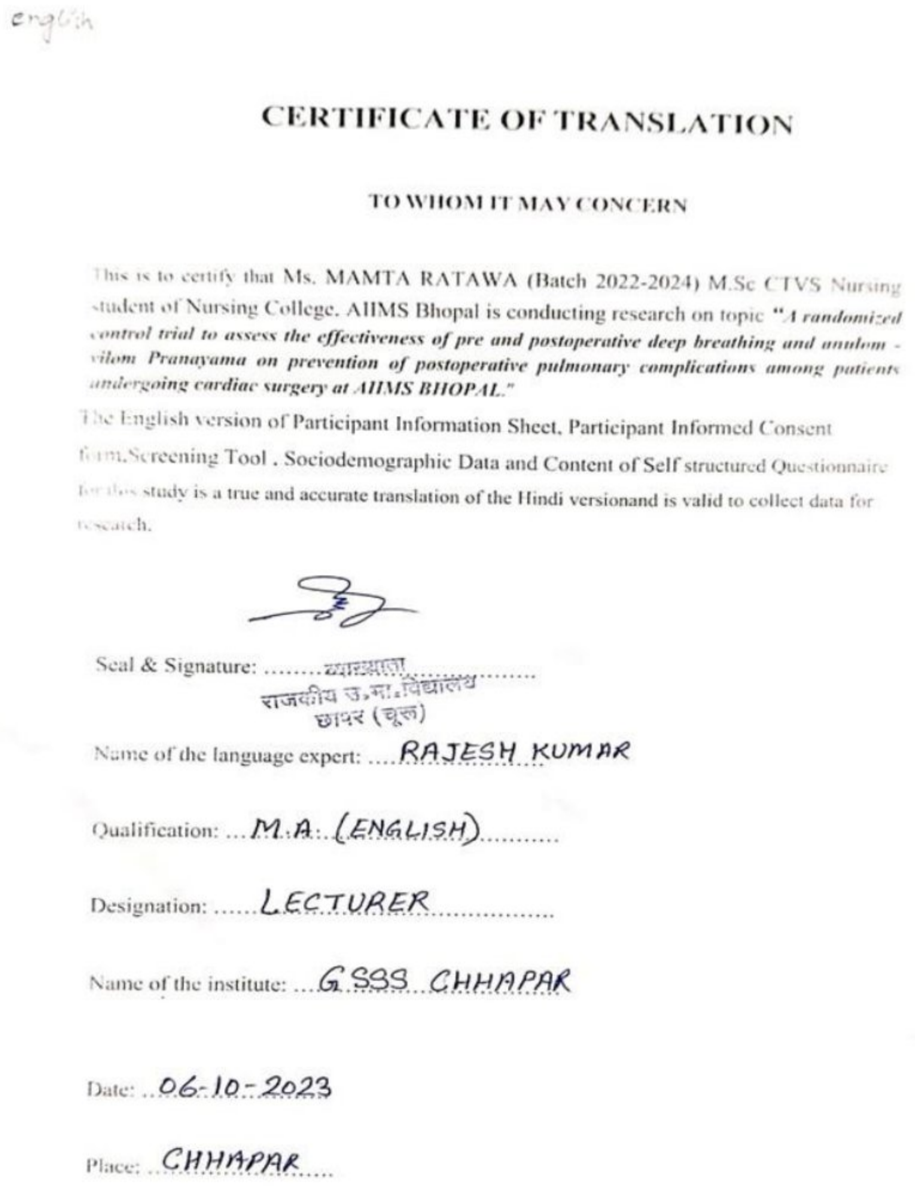
Name of the institute: Govt. P.C.B. Sr.Sec. School,
Sujangarh.

Date: 25/09/2023.

Place: ..Sujangarh.

ANNEXURE 10
CERTIFICATES OF LANGUAGE TRANSLATION

Hindi – English



english

CERTIFICATE OF TRANSLATION

TO WHOM IT MAY CONCERN

This is to certify that Ms. MAMTA RATAWA (Batch 2022-2024) M.Sc CTVS Nursing student of Nursing College. AIIMS Bhopal is conducting research on topic "*A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom - vilom Pranayama on prevention of postoperative pulmonary complications among patients undergoing cardiac surgery at AIIMS BHOPAL.*"

The English version of Participant Information Sheet, Participant Informed Consent form,Screening Tool . Sociodemographic Data and Content of Self structured Questionnaire for this study is a true and accurate translation of the Hindi versionand is valid to collect data for research.

Seal & Signature: ....व्याख्याता..................
राजकीय उ.मा.विद्यालय
छापर (चूरू)

Name of the language expert: ....RAJESH KUMAR

Qualification: ...M.A. (ENGLISH)..........

Designation: ......LECTURER................

Name of the institute: ...G.SSS CHHAPAR

Date: ..06-10-2023

Place: ..CHHAPAR.....

ANNEXURE 11

PARTICIPANT INFORMATION SHEET-ENGLISH

“A randomized control trail to assess the effectiveness of deep breathing exercises and anulom -vilom Pranayama on prevention of pulmonary complications in post cardiac surgery patients at AIIMS BHOPAL”

Dear Sir/Madam,
Please read the following. You are requested to participate in a study to be conducted by M.Sc nursing student of Nursing College, AIIMS Bhopal

Introduction and Purpose of the study:

Postoperative pulmonary complications are major frequent incidents after operations, the risk is higher after cardiac surgeries. PPCs contribute significantly to morbidity and mortality, hospitalization cost. To prevent or lesser these complication conventional methods are used like incentive spirometry. Incentive spirometry is also a technique of deep breathing.
This study will be conducted to assess the effectiveness deep breathing and anulom vilom pranayama to prevent or lesser the incident pf pulmonary complication (here Atelectasis is considerable pulmonary complication.)

Eligibility to participate in study: You are invited to participate in the study as you have age >18 years and planned for cardiac surgery:

Procedure in the study: if you agree to participate in the study, after taking informed consent some question will be asked to you regarding your personal data and advised to perfume deep breathing exercise with spirometry or only incentive spirometry**.**
Potential risks involved: Information provided by you will be strictly confidential and would not be used for any other purpose. You do not give up any of your legal rights on agreeing to participate in the study

Potential benefits involved in the study: this study may help assess the effective ness between deep breathing and anulom vilom pranayama and post- operative pulmonary complications. .There is no financial benefit involved in the study.

Expected number of participants: 50

Confidentiality

Efforts will be made to keep your study-related information confidential. Instead of your name this study will use a code so that your name will not be revealed.

Contact and questions:

For any concern and suggestions about this study, you may contact- 9460076548

Email - mamtar.mscnursing22@aiimsbhopal.edu.in

ANNEXURE 12

प्रतिभागी सूचना पत्रक -

“शीर्षक "एम्स भोपाल में पोस्ट कार्डियक सर्जरी रोगियों में फुफ्फुसीय जटिलताओं की रोकथाम पर गहरी श्वास अभ्यास और अनुलोम-विलोम प्राणायाम की प्रभावशीलता का आकलन करने के लिए एक यादृच्छिक नियंत्रण ट्रेल"

प्रिय महोदय/मैडम, कृपया निम्नलिखित पढ़ें। आपसे अनुरोध है कि नर्सिंग कॉलेज, एम्स भोपाल के M.Sc नर्सिंग छात्र द्वारा किए जाने वाले अध्ययन में भाग लें

अध्ययन का परिचय और उद्देश्य:
ऑपरेशन के बाद पोस्टऑपरेटिव पल्मोनरी जटिलताएं प्रमुख लगातार घटनाएं हैं, कार्डियक सर्जरी के बाद जोखिम अधिक होता है। पीपीसी रुग्णता और मृत्यु दर, अस्पताल में भर्ती लागत में महत्वपूर्ण योगदान देते हैं। इन जटिलताओं को रोकने या कम करने के लिए पारंपरिक तरीकों का उपयोग प्रोत्साहन स्पिरोमेट्री की तरह किया जाता है। प्रोत्साहन स्पिरोमेट्री भी गहरी सांस लेने की एक तकनीक है। यह अध्ययन फुफ्फुसीय जटिलता की घटना को रोकने या कम करने के लिए गहरी सांस लेने और अनुलोम विलोम प्राणायाम की प्रभावशीलता का आकलन करने के लिए आयोजित किया जाएगा (यहां एटेलेक्टेसिस काफी फुफ्फुसीय जटिलता है।

अध्ययन में भाग लेने के लिए पात्रता: आपको अध्ययन में भाग लेने के लिए आमंत्रित किया जाता है क्योंकि आपकी आयु >18 वर्ष है और कार्डियक सर्जरी के लिए योजना बनाई गई है:

अध्ययन में प्रक्रिया: यदि आप अध्ययन में भाग लेने के लिए सहमत हैं, तो सूचित सहमति लेने के बाद आपसे आपके व्यक्तिगत डेटा के बारे में कुछ प्रश्न पूछे जाएंगे और स्पिरोमेट्री या केवल प्रोत्साहन स्पिरोमेट्री के साथ गहरी श्वास व्यायाम को इत्र देने की सलाह दी जाएगी।
संभावित जोखिम शामिल हैं: आपके द्वारा प्रदान की गई जानकारी सख्ती से गोपनीय होगी और किसी अन्य उद्देश्य के लिए उपयोग नहीं की जाएगी। आप अध्ययन में भाग लेने के लिए सहमत होने पर अपने किसी भी कानूनी अधिकार को नहीं छोड़ते हैं

अध्ययन में शामिल संभावित लाभ: यह अध्ययन गहरी सांस लेने और अनुलोम विलोम प्राणायाम और पोस्ट-ऑपरेटिव फुफ्फुसीय जटिलताओं के बीच प्रभावीता का आकलन करने

में मदद कर सकता है। . अध्ययन में कोई वित्तीय लाभ शामिल नहीं है।
प्रतिभागियों की अपेक्षित संख्या: 50

गोपनीयता: आपके अध्ययन संबंधी जानकारी गोपनीय रखने का प्रयास किया जाएगा। आपके नाम के बजाय यह अध्ययन एक कोड का उपयोग करेगा ताकि आपका नाम प्रकट न हो।

संपर्क और प्रश्न: इस अध्ययन के बारे में किसी भी चिंता और सुझाव के लिए, आप संपर्क कर सकते हैं - 9460076548
Email - mamtar.mscnursing22@aiimsbhopal.edu.in

ANNEXURE 13

PARTICIPANT INFORMED CONSENT FORM (PICF) (English)

Participant Identification Number for this Study: ………………
Title of Project: A randomized control trial to assess the effectiveness of pre and postoperative deep breathing and anulom-vilom Pranayama on prevention of postoperative pulmonary complication among patients undergoing cardiac surgery at AIIMS BHOPAL.
Name of Student Investigator: Ms. Mamta ratawa
Tel No.(s): 9460076548
Name of Thesis Guide: Dr. Anurag Bhai Patidar

The contents of the information sheet version II dated 20 August 2022 that was provided have been read carefully by me / explained in detail to me, in a language that I comprehend, and I have fully understood the contents. I confirm that I have had the opportunity to ask questions. The nature and purpose of the study and its potential risks/benefits and expected duration of the study, and other relevant details of the study have been explained to me in detail. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal right being affected.

I understand that the information collected about me from my participation in this research and sections of any of my medical notes may be looked at by responsible individuals from AIIMS. I give permission for this individual to have access to my records.

If participants are child, his/her verbal of written assent has been obtained.
I agree to take part in the above study.

____
(Signature/Left Thumb Impression)

Date…………………………… Place …………..................................
Name of the participant………………………………………………………….............
Son/Daughter/Spouse of……………………………………………………………….
Complete Postal Address ………………………………………………………………..
If illiterate.
The information sheet has been read and explained to the participant and given the opportunity to ask questions. I confirm that the individual has given consent freely.

____
Signature of Legally acceptable representative or impartial witness.
Date:
Name of LAR or impartial witness:
Address:
This is to certify that the above consent has been obtained in my presence.
____

Signature of the student Investigator Date ………………… Place…………………
NB: Three copies should me made, for (1) Patient, (2) Researcher, (3) Institution
(Students are requested to prepare the translation in simple understandable Hindi on their own.)

ANNEXURE 14

PARTICIPANT INFORMED CONSENT FORM (PICF) (Hindi)

प्रतिभागी सूचना सहमति प्रपत्र

इस अध्ययन के लिए प्रतिभागी का पहचान नंबरः ....
अनुसंधान का शीर्षक: एम्स भोपाल में नर्सिंग अधिकारियों के बीच कार्डियक अतालता की इलेक्ट्रोकार्डियोग्राम व्याख्या के बारे में ज्ञान पर नर्स के नेतृत्व वाले हस्तक्षेप की प्रभावशीलता का मूल्यांकन करने के लिए एक प्रायोगिक अध्ययन।
शोधकर्ता छात्र का नाम : ममता रतावा फोन नं: 9460076548

शोध मार्गदर्शक का नाम : डॉ. अनुराग भाई पाटीदार

मैंने दिनांक 20.08.2022 के सूचना पत्रक संस्करण ॥ में दिए गए सभी तथ्यों को सावधानीपूर्वक पढ़ लिया है/ मुझे अपनी भाषा में स्पष्ट रूप से विस्तारपूर्वक समझा दिया गया है, और मैंने तथ्यों को पूर्णतः समझ लिया है। मैं पुष्टि करता/ करती हूँ, कि मुझे सवाल पूछने के अवसर प्रदान किए गए।
मुझे इस अध्ययन की प्रकृति एवं उद्देश्य और इसके संभावित जोखिमों / लाभों तथा अध्ययन की अनुमानित अवधि एवं अन्य प्रासंगिक जानकारी के बारे में विस्तारपूर्वक समझा दिया गया है। मुझे पता है कि इस अध्ययन में मेरी भागीदारी स्वैच्छिक है तथा मैं इस अध्ययन से किसी भी समय बिना कोई कारण बताए, अपना नाम वापस लेने के लिए स्वतंत्र हूं और नाम वापस लेने पर मेरी चिकित्सा देखभाल या कानूनी अधिकारों पर कोई प्रभाव नहीं पड़ेगा।
मैं समझता/समझती हूं कि इस अनुसंधान में मेरी भागीदारी से मेरे बारे में एकत्र की गई जानकारी और मेरे चिकित्सीय दस्तावेजों के किसी भी भाग को एम्स के जिम्मेदार व्यक्तियों द्वारा ही देखा जाएगा। मैं इन व्यक्तियों को मेरे रिकॉर्ड प्राप्त करने की अनुमति प्रदान करता/ करती हूँ।
यदि प्रतिभागी बच्चा है तो उसकी मौखिक या लिखित सहमति प्राप्त की गई है।
मैं उक्त अध्ययन में भाग लेने के लिए सहमत हूं/

____
(प्रतिभागी के हस्ताक्षर / बांए अंगूठे का निशान)
दिनांक................................. स्थान....................................
प्रतिभागी का नाम...................................
पिता/पति/पत्नी का नाम...........................
डाक का पूरा पता.........................
अगर अशिक्षित हों
सूचना पत्र को प्रतिभागी को पढ़ा और समझाया गया है और प्रश्न पूछने का अवसर दिया गया है। मैं पुष्टि करता हूं कि व्यक्ति ने स्वतंत्र रूप से अपनी सहमति दी है ।
कानूनी रूप से स्वीकार्य प्रतिनिधि या निष्पक्ष गवाह के हस्ताक्षर

दिनांक.............
एलएआर या निष्पक्ष गवाह का नाम:
पता:
प्रमाणित किया जाता है कि उक्त सहमति मेरी उपस्थिति में प्राप्त की गई ।

ANNEXURE 15

INTERVENTION PROTOCOL

Descriptions of Intervention

Deep breathing exercise involving slow, deep inhalation through the nose, followed by a prolonged exhalation through pursed lips or the mouth. This technique aims to promote expansion of the lungs and increase oxygenation.

Anulom vilom pranayama is a specific form of controlled breathing originating from traditional yoga practices, involving alternating nostril breathing. It typically consists of inhaling through one nostril while blocking the other, followed by exhaling through the alternate nostril.

Preparation before the intervention

Patient preparation

- Greet the patient and introduce yourself.
- Place the patient in comfortable sitting position.
- Explain the procedure to the patient and instruct them to observe while demonstration will given.

Environment preparation

- Area should be well lighted and room should be warm enough to be comfortable for the client
- Time should be convenient for investigator and participants.
- Positioning of the client in upright position.

PHASE –I Deep breathing (3min.)

The participants were instructed to sit comfortably with straight spine and close the eyes and relax the whole body.

- Observe the natural and spontaneous breathing process
- Next ,Instructed to inhale quickly for count of 4 and deeply and exhale slowly and completely up to count of 4 , It is one round , repeated for 12 round
- Then open your eyes and take a rest of 30-60 sec.

PHASE-II Anulom vilom pranayama (5-7 min.)

- Participants were instructed to breathe slowly using alternate nostril.
- Each breathing cycle comprised inspiration (four counts), expiration (four counts) and follow the following protocol
- Close the right nostril with the thumb and inhale deeply through the left nostril for a count of four until the inhalation ends comfortably.
- Close the left nostril with the help of ring finger , release the thumb from the right nostril and exhale through the right nostril up to a count of four.
- Next, inhale deeply through the right nostril, keeping the same count in the same manner.
- Close the right nostril with the thumb and exhale through the left nostril up to a count of four.
- This is one round.
- Practice 10 rounds

ANNEXURE 16

CODING OF MASTER DATA SHEET

SECTION –A SOCIODEMOGRAPHIC PROFILE

Abbreviations	Full form	Coding
AGE	Age	1 <30 yr 2 30-45 yr 3 46-60yr 4 >60yr
GENDER	Gender	1 Male 2 Female 3 other
EDUATION	Education qualification	1 No formal education 2 Primary 3 secondary 4 Higher secondary 5 Graduate and above
OCCUPATION	Occupation	1 Home maker 2 laborer 3 professionals 4 Any other
RILIGION	Religion	1 Hindu 2 Muslim 3 Christan 4 Any other
EXERCISE	Exercise	1.yes 2.No
RESIDENTIAL AREA	residential area	1 urban 2 rural 3 slum
TYPE OF FAMILY	type of family	1 nuclear 2 extended 3 joint
INCOME	income	1 <9226 2 9232 - 27654 3 27654-46095 4 46095-68961
SMOKING HISTORY	Smoking history	1 Yes 2 No

BMI	Body mass index	1 Underweight 2 Normal weight 3 overweight 4 obese 5 Extremely obese
DIETARY PATTERN	Dietary pattern	1 vegetarian 2 Non-veg 3 Any other

SECTION – B CLINICAL PROFILE

Abbreviations	**Full form**	**Coding**
MEDICAL DIAGNOSIS	Medical Diagnosis	1 CAD + TVD 2 VALULER DISODER 3 ASD/VSD
DURATION OF ILLNESS	Duration of illness	1 <2 months 2 3-12 moths 3 >1 year
CO-MORBIDITY	Co-Morbidity	1 Yes 2 No
NAME OF SURGERY	Name of Surgery	1 CABG 2 Valve Repair/Replace 3ASD/VSD Closure
PREVIOUS HISTORY OF SURGERY	Previous history of Surgery	1 Cardiac 2 Non-Cardiac Surgery 3 No Surgery
TYPE OF ANESTHESIA GIVEN	Type of Anesthesia Given	1 General Anesthesia

SECTION – C OBSERVATION CHECKLIST

Abbreviations	**Full form**	**Coding**
ATELECTAIS	Atelectasis	1 Absent 2 Present
P.EDEMA	Pulmonary edema	1 Absent 2 Present
P.EFFUSION	Pleural effusion	1 Absent 2 Present
PNEUMONIA	Pneumonia	1 Absent 2 Present

ANNEXURE 17
MASTER DATA SHEET

Section-A Sociodemographic data (Experimental group)

SUB.	AGE	GENDER	EDU.	OCCU.	RELIGION	EX. Habits	RESIDENCE	FAMILY	INCOME	SMOKING	BMI	DIET
1	48	2	1	1	1	1	2	3	3	2	3	1
2	62	2	2	2	1	2	2	3	1	2	3	1
3	44	1	2	4	1	2	2	1	1	1	2	3
4	53	2	1	1	1	2	2	1	1	2	2	1
5	52	1	2	4	1	2	2	1	1	1	3	2
6	48	1	3	4	1	2	1	1	2	1	3	1
7	55	2	2	1	1	2	2	3	2	2	2	1
8	62	1	2	2	2	2	2	3	2	2	2	2
9	39	1	1	2	1	2	2	1	2	2	2	1
10	26	2	2	1	1	2	2	3	1	2	2	2
11	27	1	2	2	1	1	2	3	1	2	1	2
12	58	1	2	4	1	2	1	3	2	1	3	1
13	26	2	2	1	1	2	2	1	2	2	1	2
14	69	1	5	3	1	2	1	1	3	2	2	1
15	25	2	4	1	1	2	2	1	1	2	2	1
16	35	1	1	4	1	2	1	3	1	1	2	2
17	46	1	5	3	1	1	1	1	4	2	2	1
18	52	1	2	3	1	2	1	1	3	1	2	2
19	19	1	3	2	1	2	2	3	1	2	1	1
20	27	2	5	1	1	2	2	3	5	2	2	1

Section – A sociodemographic data (Control group)

SUB.	Age	Gender	Edu.	Occu.	Religion	Habit Of Exercise	Residence	Family	Income	Smoking	BMI	Diet
1	50	2	2	1	1	2	2	1	2	2	2	1
2	55	1	2	4	1	2	1	3	1	1	2	1
3	62	1	2	4	1	2	2	1	2	1	1	1
4	42	1	2	4	1	2	2	1	1	1	2	2
5	31	2	2	1	1	2	2	1	1	2	2	1
6	44	2	2	1	1	2	1	3	1	2	2	1
7	53	2	1	1	1	2	1	1	1	2	2	1
8	26	2	3	1	1	2	2	3	2	2	1	1
9	59	1	2	4	1	2	2	3	5	2	2	1
10	62	1	3	1	1	2	1	3	1	2	2	1
11	55	1	4	4	1	2	2	1	2	2	2	2
12	54	1	3	2	1	1	1	1	1	2	2	2
13	32	2	2	1	1	2	2	3	2	2	2	1
14	29	2	4	1	1	2	1	1	2	2	1	1
15	59	1	4	1	1	2	1	1	2	2	1	1
16	35	1	2	1	1	2	1	3	3	1	2	1
17	33	2	3	1	1	2	1	3	3	2	2	1
18	33	1	2	1	1	2	2	3	3	2	2	1
19	26	1	5	4	1	2	2	2	2	2	2	2
20	51	2	1	1	1	2	2	3	2	2	2	1

Section B: Clinical Profile (Experimental group)

SUB.	DIAG.	DUR.	CO-MORBID	SURG.	HOS	ANESTH.	Du. OF SURG.	ICU STAY (DAYS)
1	1	1	1	1	2	1	5	5
2	1	3	1	1	1	1	5	3
3	1	2	2	1	3	1	5	2
4	2	3	1	2	1	1	6	3
5	1	2	1	1	3	1	5	6
6	1	1	2	1	3	1	5	5
7	2	2	2	2	3	1	5	4
8	2	2	2	2	3	1	5	5
9	1	2	2	1	3	1	5	5
10	2	2	2	2	3	1	6	5
11	2	3	2	2	3	1	4	4
12	1	3	1	1	3	1	5	3
13	2	3	2	2	2	1	5	4
14	1	1	2	1	3	1	6	5
15	2	2	2	2	3	1	4	4
16	2	2	2	2	2	1	4	3
17	1	2	2	1	3	1	6	4
18	1	2	2	1	3	1	5	5
19	3	3	2	3	3	1	5	2
20	3	2	2	3	3	1	5	3

Section – B clinical data (Control group)

SUB.	DIAGNOSIS	DURATION	CO-MORBID	SURGERY	HOS	ANESTH.	DU. O SURG.	ICU STAY (DAYS)
1	1	1	2	1	3	1	6	6
2	2	3	2	2	3	1	6	6
3	1	3	1	1	3	1	7	10
4	2	2	2	2	3	1	5	8
5	2	3	2	2	3	1	4	6
6	2	3	2	2	1	1	5	7
7	2	3	1	2	3	1	5	5
8	3	3	2	3	2	1	5	5
9	2	3	2	2	3	1	5	4
10	1	1	2	1	3	1	6	4
11	1	2	2	1	3	1	6	6
12	1	1	2	1	3	1	5	6
13	2	2	2	2	3	1	5	6
14	2	2	2	2	3	1	6	6
15	2	1	2	2	3	1	5	5
16	2	1	2	2	3	1	6	7
17	2	3	2	2	2	1	5	5
18	3	3	2	3	3	1	5	3
19	2	2	2	2	3	1	4	4
20	1	2	2	1	3	1	5	3

SEC-C POST TEST X- ray Evaluation (Experimental and Control group)

Group	Subject	Atelectesis	P.Edema	P.Effusion	Pneumonia	Group	Atelectesis	P.Edema	P.Effusion	Pneumonia
Exp	1	1	2	1	1	Control	1	1	1	2
Exp	2	1	1	1	1	Control	2	2	1	1
Exp	3	1	1	1	1	Control	2	1	1	2
Exp	4	1	2	1	1	Control	1	1	1	2
Exp	5	1	2	1	2	Control	2	1	1	1
Exp	6	1	1	1	1	Control	1	1	1	1
Exp	7	1	1	1	1	Control	1	2	1	1
Exp	8	1	2	2	1	Control	1	1	1	1
Exp	9	1	2	2	1	Control	1	1	2	1
Exp	10	1	1	1	1	Control	1	1	2	1
Exp	11	1	1	1	1	Control	2	1	1	1
Exp	12	2	1	2	1	Control	2	1	1	1
Exp	13	1	1	1	1	Control	2	1	1	1
Exp	14	1	1	1	2	Control	1	1	1	2
Exp	15	1	2	1	1	Control	2	1	1	1
Exp	16	1	1	1	1	Control	1	1	2	1
Exp	17	1	1	1	1	Control	1	1	1	1
Exp	18	1	1	1	1	Control	1	1	1	1
Exp	19	1	1	1	1	Control	2	1	1	1
Exp	20	1	1	1	1	Control	2	1	1	1